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November 19, 2002

*Ex Parte*

Ms. Marlene H. Dortch  
Office of the Secretary  
Federal Communications Commission  
445 12<sup>th</sup> Street, S. W.  
Room TW-A325  
Washington, DC 20554

Re: Review of the Section 251 Unbundling Obligations of Incumbent  
Local Exchange Carriers, CC Docket No. 01-338;  
Appropriate Framework for Broadband Access to the Internet Over  
Wireline Facilities, CC Docket No. 02-33

Dear Ms. Dortch:

I am writing to provide follow-up information as requested by the staff from the Competition Policy Division of the Wireline Competition Bureau in a meeting on October 15, 2002 in connection with the above referenced proceedings. During our discussion, several points regarding the state of broadband competition were raised. Specifically, BellSouth discussed why the Commission should refrain from unbundling network elements used for the provision of broadband services. BellSouth's basis for this position centered on the fact that Congress created the unbundling requirements of Section 251 as an entry path into the local exchange market – not into the already competitive broadband market. Even if the Commission applied Section 251 to broadband services, however, it must consider the competitiveness of the market and the impact unbundling will have on future investment in its impairment analysis. To that end, BellSouth discussed the burgeoning competition in the Broadband market and how digital subscriber line service ("DSL") is overshadowed by the dominance of cable modem service.

As part of this discussion, BellSouth presented facts regarding the market share growth of different broadband providers for 2001. These facts showed that market share for new customers added within each quarter of 2001 remained between 66% and 71% for cable modems and only between 27% and 31% for DSL. The Commission staff asked if BellSouth could provide the updated number for 2002. A report issued by Morgan Stanley on October 8, 2002 stated the numbers as 63% cable modem and 37% DSL for the first quarter of 2002, and 66% cable modem and 34% DSL for the second quarter of 2002. These numbers for 2002 demonstrate that cable

modem service continues to outpace DSL for new customers, thus perpetuating cable modem service's dominance of the broadband industry.

Another area of interest during BellSouth's presentation related to the distribution of BellSouth's wholesale and retail customers. On the retail side, the staff wanted to know how many of BellSouth's Fast Access customers were business customers and how many were residential customers. On the wholesale side, the staff expressed an interest in the number of line sharing and line splitting customers BellSouth has. Currently, BellSouth has approximately 766,000 residential Fast Access customers and approximately 95,000 small business Fast Access customers. As for line sharing customers, BellSouth had over 7,000 customers at the end of September. BellSouth had only 14 line splitting customers at the end of September. Even though line sharing has been in place since 2000 and line splitting since 2001, these numbers clearly illustrate the limited demand for these services by carrier customers.

During the presentation on competition, the evidence of the dominance of cable modem services over the broadband market was discussed. Additionally, BellSouth briefly pointed out that other competitors, particularly satellite and wireless providers, were making strides in gaining broadband market share. The staff wanted additional information regarding entities that are using or will use satellite and various wireless technologies within the next three years to compete in the provision of broadband services. Pursuant to this request, BellSouth provides the Commission staff several articles and websites that demonstrate how these new technologies are not merely possibilities in the future but are being used today.

While BellSouth provides additional information on satellite and wireless competitors below, it points out to the Commission that cable modem service providers, the dominant broadband service provider, have no unbundling obligations. Indeed, in the recent cable modem order,<sup>1</sup> the Commission made no reference to a requirement that there be three or more competitors for broadband services as a prerequisite for ordering minimal regulatory oversight over cable modem service providers. Parity between cable modem providers and DSL providers must be an outcome of this proceeding and the associated broadband proceedings. There is no sustainable legal justification for holding DSL service (with less than a third of the market) to some higher competitive standard than cable modem service providers (with over 65% of the market). And, while regulatory parity between cable modem providers and DSL providers should be obtained on that fact alone, there is considerable evidence to show that satellite and wireless technologies are available today in some areas, or will be available within the next few years.

For example, high-speed broadband service via satellite takes several forms, including direct transmission to small home satellite dishes. Hughes Communications offers high-speed Internet access service via satellite to subscribers "that's available to everyone in the continental

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<sup>1</sup> *In the Matter of Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities; Internet Over Cable Declaratory Ruling; Appropriate Regulatory Treatment for Broadband Access to the Internet Over Cable Facilities*, GN Docket No. 00-185 and CS Docket No. 02-52, *Declaratory Ruling and Notice of Proposed Rulemaking*, 17 FCC Rcd 4798 (2002).

United States regardless of where you live” through its DIRECWAY offerings.<sup>2</sup> The cost for this service is \$59.99 per month plus hardware.<sup>3</sup>

Additionally, technology that uses the 802.11 standard for wireless networking (commonly known as “wireless fidelity” or “Wi-Fi”) is beginning to make a significant impact in broadband access for communities, as well as for business.<sup>4</sup> BellSouth includes several recent articles on the use of Wi-Fi and websites of companies using it today to provide broadband services.<sup>5</sup> For example, T-Mobile has recently entered into an agreement with Starbucks Coffee Company to provide high speed Internet access for Starbucks customers while patronizing a Starbucks establishment. Customers who have a Wi-Fi connection capability can log on to the Internet to check email or surf the web. T-Mobile has entered into a similar arrangement with Borders Books and Music locations.

Moreover, companies are beginning to offer Wi-Fi as an alternative to wired networks to both business and residential users. Companies such as Omnilux, Boingo, and café.com all offer Wi-Fi capability in numerous locations throughout the United States.<sup>6</sup> As one recent news article points out, businesses are finding advantages for their employees having the ability to access the Internet from any location within the business instead of being tied down to the wire at their desks. Indeed, the possibilities for Wi-Fi growth has caught the attention of such companies as Intel, who recently announced that it plans to invest \$150 million in firms that develop high-speed wireless networking technology such as Wi-Fi. Given its current use and the capability it possesses to provide broadband services with relatively low start-up costs, the Commission cannot ignore the competitive impact that Wi-Fi, and other wireless and satellite providers, are having and will have on the market.

Wi-Fi is not the only wireless alternative. Another popular technology being used for broadband services is third generation wireless services (“3G”). Although currently being used for mobile wireless applications such as access to the World Wide Web over a mobile phone, its applications can be used in a fixed environment such as provision of broadband services in buildings. Earlier in the year, Sprint projected 3G “will allow [it] to offer data services of 144 kilobits per second this year and over 3 megabits per second within two years, eclipsing standard 56 kbps dial-up Internet connections and matching or exceeding current forms of broadband access.” More recently, Sprint announced the introduction of PCS Vision that delivers speeds of

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<sup>2</sup> See [http://www.hns.com/global/north\\_america/north\\_america.htm](http://www.hns.com/global/north_america/north_america.htm) and [http://directv.direcway.com/main/order\\_now.html](http://directv.direcway.com/main/order_now.html).

<sup>3</sup> *Id.*

<sup>4</sup> While Wi-Fi will support varying speeds, its current use and future capabilities equal or exceed broadband speeds. See <http://www.boingo.com/>; Boingo advertises its product to be “100s of times faster than dial up.”

<sup>5</sup> See attached articles. Also included as part of the attachments is a Yankee Group report, *Residential Broadband: Cable Modem Remains King*, April 26, 2002, which provides a current state of the broadband market along with a forecast of trends through 2007.

<sup>6</sup> See attached articles.

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November 19, 2002

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50-70 kbps with peak speeds running up to a “perceived 300 kbps using compression techniques.”<sup>7</sup> Each of these announcements of current services as well as coming-soon products demonstrates how wireless services are formidable competitors in the broadband market.

Finally, the staff asked about deployment of fiber further into the network and the economic viability of such deployment under current regulation. In its reply comments in the Triennial UNE Review, BellSouth filed a Declaration prepared by Robert Harris, Professor Emeritus at the Walter A. Haas School of Business, University of California, Berkeley, and a Director at LECG, the law and economics consulting group. In this Declaration, Harris estimates that the cost to implement fiber-to-the-home, which will pave the way for next generation applications offered by the ILECs, will be approximately \$5,000 per subscriber, assuming a 50% penetration rate. This estimate increases to over \$9,000 if the penetration rate is 25%.<sup>8</sup> Clearly, this amount of investment is cost prohibitive with the regulatory risk that currently exists. Indeed, the mere possibility of having to unbundle broadband facilities such as fiber to the home has and will have a chilling effect on fiber to the home deployment.

I am filing this notice and the accompanying attachments electronically. Please call me if you have any questions.

Sincerely,



W.W. (Whit) Jordan

Attachments

CC: Robert Tanner

Tom Navin

Julie Veach

Daniel Shiman

Ian Dillner

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<sup>7</sup> See also, AT&T Wireless announcement of its ever expanding use of 3G technology in providing fast Internet access capability to mobile phones.  
<http://www.attws.com/press/releases/070202.jhtml>

<sup>8</sup> Reply Declaration of Professor Robert G. Harris, Attachment 3 to BellSouth's Reply Comments, CC Docket No. 01-338, at 25 (filed July 17, 2002).

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APRIL 1, 2002

SPECIAL REPORT: THE WIRELESS NET

## Wi-Fi's "Cauldron of Innovation"

**Net pioneer David Farber says it offers unprecedented opportunities for keeping people connected -- and creative**

Wi-Fi is about to go mainstream, says David Farber, professor of telecommunications at the University of Pennsylvania and one of the industry's top networking experts. That's because this technology for broadband wireless networking (which uses the popular 802.11 standard) has reached a point where it's cheap and easy enough to deploy that it will soon be ubiquitous.

Farber should know. In his 49 years in computer science, he has seen many technological breakthroughs follow the same path. An Internet pioneer, he designed the first electronic switching system during 11 years at Bell Laboratories early in his career, and today he does research on high-speed networking.

He has also become an advocate for keeping technology open to competition and unrestrained by regulation. He spent a year as the chief technologist at the Federal Communications Commission and testified as an expert witness for the government during the Microsoft antitrust trial. He is perhaps best known in tech circles for maintaining an e-mail distribution list of articles and ideas that he calls "interesting people." It reaches as many as 20,000 people daily.

These days, Wi-Fi is frequently fodder for the list. Farber is a great fan of Wi-Fi, which he feels stands apart from other wireless technologies because it operates on unlicensed spectrum, which means that regulators and large telecommunications companies don't control it. That freedom has allowed for what he calls a "cauldron of innovation" on the part of developers, which will lead to many more uses for Wi-Fi technology in homes and businesses.

With all this potential comes risk, however. Farber fully expects competing interests to try to inhibit the grass-roots innovation. While he says the warring between the big companies will be "fun to watch," he worries that regulators could be misled into thinking they need to step in -- and inadvertently stop innovation. Farber shared his thoughts with BusinessWeek Online Associate Editor [Amey Stone](#) in interviews that took place over several days via telephone and e-mail -- over a wireless network, of course. Following are edited excerpts of their discussion:

**Q: How important is Wi-Fi as a technology?**

**A:** It's very significant. This is something we talked about a long, long time ago -- the idea of being always connected to computers. You can get off an airplane and turn on your computer, and suddenly you're communicating -- all without a huge amount of regulatory overhead. That's creating a whole new generation of people who are using the technology and coming up with creative applications for it. So far, it's much more of a community thing, although businesses are starting to develop that will offer access and come up with new applications for the technology.

distracting," says Michels. Now, the wireless network lets workers enjoy the sunshine and still stay connected. "It just gives them that much more flexibility," he adds. Those who don't mind a commotion bring their laptops to the cafeteria to work during lunch.

**TAKING IT HOME.** Steve Taylor, a software architect at the company, has become a major Wi-Fi advocate. "I work in whatever space feels most comfortable at the time," he says, including home. Like many people at the company -- including Michels -- Taylor added a Wi-Fi network at home after using it at work. Now, he starts his workday at his dining table with a cup of coffee.

It has surprised Michels that some people choose to work on the wireless LAN from their laptops all day, even though the company's wired network is more robust and faster. Taylor, who uses the wireless network to test applications he has designed for handheld computers, says his favorite routine is to sign on with his Siemens SIMpad, which is easy to carry and useful for presentations and sharing information with colleagues. "The freedom it gives you is pretty overwhelming," he says.

Security concerns remain the biggest drawback, Michels says. Tarantella uses an encryption protocol known as WEP (Wireless Equivalent Privacy), but hackers can breach it with a little effort. "We do worry about it, but we've got pretty good security around critical applications," he says. "Even getting onto our network wouldn't get most people very far."

**WHY BE WIRED?** He also doesn't have too much worry about drive-by hackers, since his building isn't in a downtown area and anyone who drove up and jumped on the network using a Wi-Fi connection -- as is possible -- would attract suspicion pretty quickly.

Michels says the Wi-Fi network works well enough that it could handle all the networking needs of many businesses, making a wired network unnecessary. For companies in buildings that aren't already wired (most new buildings are), that would save the cost and hassle of running wires. Just be aware, he adds, that applications requiring a lot of bandwidth can overload a wireless network. For instance, he says Internet telephony won't work.

Overall, he says, Wi-Fi's weaknesses are few. In fact, he has grown so accustomed to having Wi-Fi access that on a recent business trip he was shocked when connections weren't available in every office and airport he visited. Many of his customers and most of his techie friends have become devoted Wi-Fi users. That's a major reason he outfitted his home: so visitors can go online from the guest rooms. For his customers, employees, and for himself, says Michels, "one computer plugged into a wall isn't acceptable anymore."

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By Amey Stone in New York

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**Q: How is Wi-Fi different from all the other wireless technologies that have been developed?**

**A:** The biggest change is that it allows for a lot more creativity. For years, the use of wireless has been very controlled. You had companies that bought spectrum space, you had cell-phone companies that sold handsets, but there was very little opportunity to get the innovation that comes from getting a large number of people to work at finding different ways to use wireless technology.

Wi-Fi gives you that. You can create a network, design applications, and build a business without having to hire Washington lawyers to do it. For example, I'm currently designing a temperature-control system for my house using Wi-Fi. And I don't need to get a license to do it.

**Q: Is Wi-Fi proliferating faster or slower than you expect?**

**A:** It's at about the speed I expected. In the early days, it cost \$300 to \$500 for a Wi-Fi card. You had to be a hero to get the software working, and it was no fun to try and get the operating system to behave correctly. But over the last six months, it has developed so you can just pick it up and plug it in. As we say in the computer-science department, even arts and sciences students can use it. A year ago, you didn't dare offer it to them.

Now, new machines have Wi-Fi built in. Handhelds have it. Next year it will be in printers. Pretty soon no one will even care that it is there -- they'll just assume it's there. This is an expected path with new technology. It happens time and time again.

**Q: Does Wi-Fi pose a risk to the incumbent wireless players who are investing in next-generation (3G) technology?**

**A:** Carriers are going to have to face the fact that, at least in congested places, there are other ways of offering high-speed connections for data transfer than 3G. With Wi-Fi you can get higher speeds than you can get from 3G, although there are places where 3G works and Wi-Fi won't. Initially, Wi-Fi will temper the business case for 3G, but 3G does have applications.

For example, I don't believe anyone is going to put in a nationwide Wi-Fi network. There are better ways to do that. Wi-Fi works very well in a relatively dense population, but it's never going to cover a lonely back road. Ultimately, Wi-Fi may create more demand for 3G services since it will wet people's whistle. People will see that this stuff does work, and they will want more.

**Q: Is there a risk that Wi-Fi could become more expensive?**

**A:** I don't think it's ever going to be expensive unless someone changes the rules. You don't need anybody to make it work. There will be people who will come in and offer services, and if they are affordable and well-thought out, people will tend to use them. In this sense it's like the early days of the Internet.

**Q: Could concerns about security hamper its spread?**

**A:** Those are growing pains. In almost every maturing technology, there are growing pains. Today, [such] problems get solved pretty fast.

**Q: Do you see any threats to your vision of Wi-Fi creating a "cauldron of innovation," as you put it?**

**A:** We just need to make sure that people whose business would be helped by Wi-Fi not succeeding aren't allowed to change the rules. There are things you could do to turn off all this creativity. History suggests that there are probably already lobbyists working on killing the golden goose. But my reading right now is that those efforts probably will not succeed. Wi-Fi is a stampede that will be hard to stop.

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**canada.com News**



Monday » October 28 » 2002

## **Intel to invest \$150M in Wi-Fi technology**

Herald News Services

*Monday, October 28, 2002*

Intel Corp. said it plans to invest \$150 million in firms developing high-speed wireless networking technology, an area of growth that Intel sees as key to accelerating revenue and profit.

Intel did not specify which companies it would invest in, or the time frame in which it would make the investments.

The most prevalent high-speed wireless technology standard used currently to connect PCs, laptops and hand-held computers to each other and the Internet is known as Wi-Fi, or 802.11.

Related to its push to spur the adoption Wi-Fi, Intel will introduce in the first half of next year its microprocessor chip code-named Banias.

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## Why Dial Up If You Can Wi-Fi? By Paul Boutin

**Story location:** <http://www.wired.com/news/wireless/0,1382,51353,00.html>

*02:00 AM Mar. 28, 2002 PST*

Millions of people now carry laptops equipped for wireless Internet access over 802.11b (aka Wi-Fi) networks. But outside of home and office, there's been no place to connect. Most wireless networks are private, and investors are wary of funding Wi-Fi setups in public places.

A new company called Joltage wants to change that, by letting the operators of home and business Wi-Fi networks make a little money reselling their spare capacity to passersby.

Joltage, founded by Andrew Weinreich (founder of the defunct SixDegrees.com) combines Weinreich's penchant for viral marketing with a user-friendly payback scheme. The company provides a free software download that lets Wi-Fi base operators set up controlled access to their network for laptop-toting Joltage subscribers, who pay \$1.99 per hour or \$24.99 per month for the privilege.

Once a month, Joltage claims it will split its net revenues with base owners based on the amount of traffic to each access point, and send each a kickback through electronic payment website PayPal.

The company, which formally launched its service on Monday, has not yet announced either the number of subscribers or access points signed up since then. But unlike Boingo, another recently launched bandwidth-reselling business model, Joltage is the first to focus on mom-and-pop operators with a single base lying around the house, allowing them to become "micro-ISPs," in industry parlance.

"This market is exploding," said Joltage CEO Michael Chaplo, a 20-year AT&T veteran. "In five years, most public space will be wired for Wi-Fi."

Yet today, commercial access points in the United States only number a few thousand, clustered around airports, hotels and convention centers. Network builders like Wayport and iPass focus on business travelers who'll pay anything to get a fat line back to the office.

Analyst Allied Business Intelligence estimates more than 20 million 802.11b-equipped devices will be shipped annually by 2005, yet there's been almost no action from major wireless carriers to set up base units to which these millions of devices can connect.

"The equipment manufacturers have already placed their bets," Chaplo agreed, "but there's no significant presence in terms of access footprint (the area of available coverage). We see a lot of potential."

Others are more skeptical of the demand for widespread Wi-Fi. "It's a combination of the cost of the service and the value," said Bennett Kobb, a Washington analyst and author of the book *Wireless Spectrum Finder*. "You and I see a lot of value to the service. But across the whole country, we're in the minority."

Officials at wireless carriers cite Metricom's Ricochet network, which shut down in bankruptcy last year after too few customers signed up, as an indicator of lax demand.

Joltage hopes to spread Wi-Fi's footprint one base at a time to neighborhoods, office parks and campuses, adding myriad hotspots where laptop toters can open up their notebooks and find an available wireless signal. Many such locations already have a network nearby, but one protected by a password to keep passersby from using it for free.

Chaplo forecasts a repeat of the way mobile phones were adopted: "The first market is the business traveler, but the consumer market will follow them," he said.

Joltage was the uncontested hotspot at this week's PC Forum -- attendees posted raves to the Net (via Wi-Fi, of course), while executives were still onstage.

Wi-Fi is one of the few areas of enthusiasm and evangelism in a tech landscape chilled by economic downturns and terrorism last year. "People react to it the way they did to the first time they used the Internet, or heard 'Smells like Teen Spirit,'" said Cliff Skolnick, an engineer currently planning an 802.11b network for downtown Santa Cruz, California.

Wi-Fi junkies hope Joltage will spawn an outbreak of micro-ISP operators setting up access points in locations ignored by the major network builders. But ISP operators warn that DSL and cable modem lines are priced for lower traffic levels.

At \$50 per month, a DSL line -- if shared by multiple users -- could easily

eat up several hundreds of dollars' worth of wholesale network traffic at the back end.

"As ISPs realize this stuff is going on, they're going to start looking closer at the heavy traffic users," said Mike Durkin, president of Raw Bandwidth Communications, a Belmont, California, provider of home DSL service. "Think Napster and how ISPs and universities can block it."

Chaplo suggests aspiring Wi-Fi resellers "read their usage agreements carefully."

Wi-Fi experts also warn that providing hotspot service to the public may prove more technically challenging than it seems. "Most people (who download the Joltage software) are not going to add external antennas on their house, buy an extra computer, etc., to make the system run properly," Skolnick said.



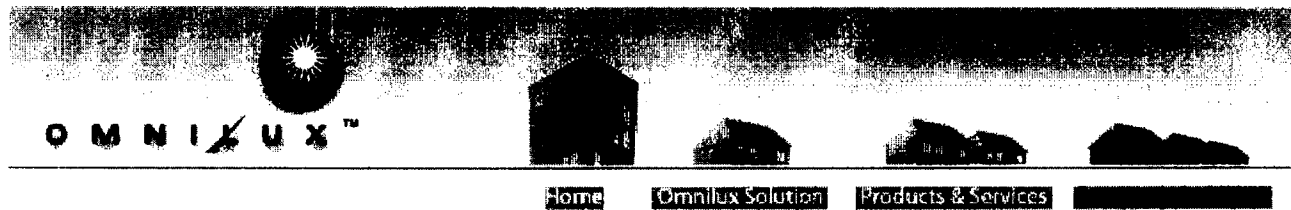
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## Company Overview

- Our Mission
- The Team
- Job Opportunities
- Press Releases

### Our Mission

Combining the strengths of free space optics and Wi-Fi technologies, Omnilux service providers the most cost-effective solution to rapidly deploy a high speed optical wireless broadband network for the residential and small business markets.

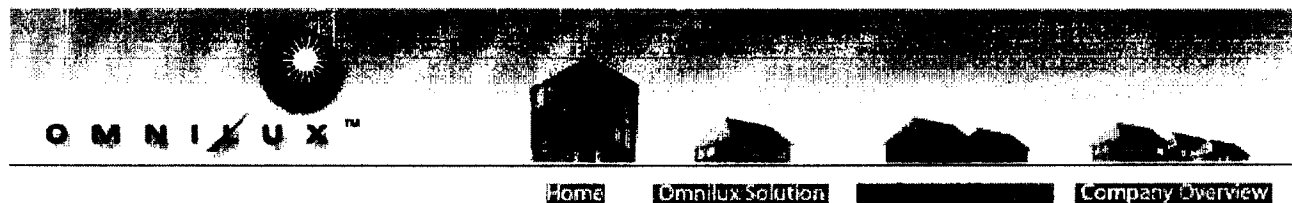
### History

Omnilux was founded in May 2001 to develop alternative broadband access technologies, specifically targeting the residential, small office/home office (SOHO) and small and medium sized enterprise (SME) markets. Omnilux is wholly owned and funded by Idealab.

Founded in 1996 by entrepreneur Bill Gross, Idealab's mission is to found, grow, and operate technology companies. Idealab helped found such noteworthy companies: Overture Services (NASDAQ:OVER), Citysearch (acquired by Ticketmaster, NASDAQ:TMCS), NetZero (now part of United Online, NASDAQ:UNTD), and CarsDirect. Idealab brings significant expertise in growing businesses to Omnilux.

### The Market Opportunity

The market for high-speed access is growing rapidly. DSL and cable modem reach approximately 11 million U.S. homes, but most forecasts indicate that this will increase to over 40 million homes domestically and 100 million homes worldwide by 2004. However, there are still sizable gaps in the existing broadband network. Some estimate that up to 40% of U.S. consumers do not have access to any broadband (and the percentage is much higher internationally). Further, among incumbent technologies, only the HFC networks of cable MSOs are capable of providing true broadband applications. Other technologies such as DSL and cable suffer from issues such as limited bandwidth capacity, slow upstream speeds, and latency. Other fixed wireless technologies promised to solve this issue but are not yet economic. For service providers with the foresight to recognize the large, growing underserved broadband access market, Omnilux will provide the first cost-effective means of building a true broadband network.



## Products & Services

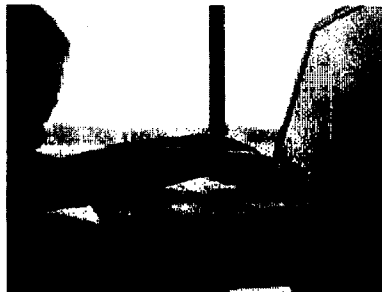
### ► System Overview

Omni-Node  
Clear-Mesh  
Site-Guide  
Service Levels

## Omnilux System Overview

### The Most Cost Effective Solution For Last Mile Access

Omnilux provides a full suite of proprietary hardware and software to deliver a solution for last mile access.



 **Product & Services PDF**  
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#### 1. Omni-Node™

Auto-acquiring and tracking nodes and auto system reconfiguration make installation and maintenance quick and easy.

#### 2. Clear-Mesh™

Repeating mesh network topology and active network management and control tools ensure maximum performance and high system reliability.

#### 3. Site-Scout™

Line of sight modeling software allows for rapid system deployment without the need for highly skilled technicians or expensive site surveys.

Omnilux also offers three service levels to fulfill the needs of service providers.

Service Specifications:

#### Bandwidth:

Variable up to 100 Mbps full duplex\*

#### Uptime:

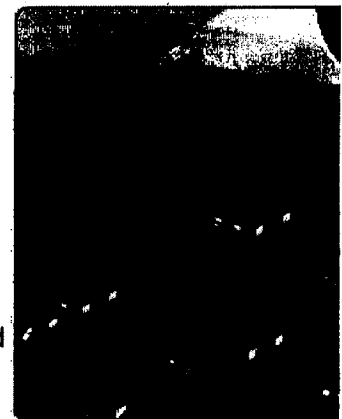
99.99% on average\*\*

#### Applications:

True broadband

#### Local Area Network:

Wi-Fi (802.11b)



[Click here to view larger image](#)

\* Bandwidth can be provisioned to any rate up to 100 Mbps

\*\* Depends on local topography and at conditions



## Omnilux Solution

- Solution Overview
- Key Benefits
- Compare to RF Wireless



Deployment of an Omnilux™ Omni-Node on a customer's roof.

## Omnilux Solution

### The Most Cost Effective Solution For Last Mile Access

Omnilux delivers a complete and cost-effective technology solution to last mile problems. Together with service providers, Omnilux provides high-speed Internet access and broadband applications to the residential, small office (SOHO) or medium enterprise (SME) markets. Omnilux's proprietary hardware and software utilizes the strengths of free space optics (FSO) technology to transmit data, video through the air via low powered LEDs and Wi-Fi technology. By partnering with Omnilux, service providers can minimize the costs to deploy and maintain a broadband network while maximizing the average revenue per user.

**Build and operate a robust broadband network** - Offering a full suite of hardware and intelligent software along with three service levels to meet the needs of service providers. (See "Omnilux Products" sheet for more information.)

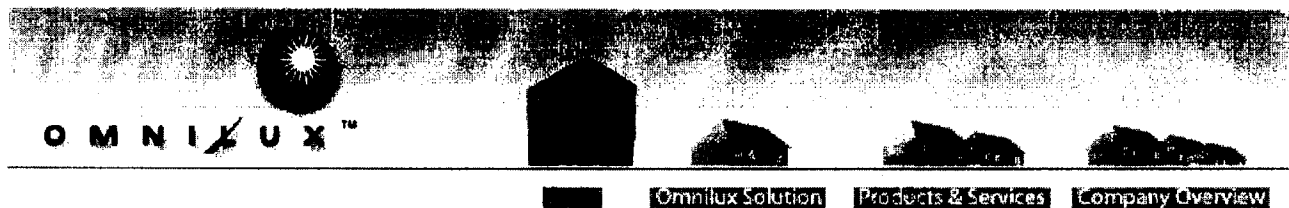
**Minimize upfront investment** - Our highly variable cost structure eliminates the need for building out a broadband network. A majority of the cost of building out the network occurs only after a customer orders service.

**Minimize the cost per deployment** - Service new customers five times faster at just 15% of the cost of other technologies. Complete field installation in less than 1 hour on average with the help of Omnilux's Omni-Node™ technology.

**Manage the network efficiently** - Omnilux's Clear-Mesh software is a comprehensive network management tool to monitor, optimize, provision and automatically reconfigure the network.

### Maximize revenue

- 1) reaching new customers that are unserviceable currently
- 2) increasing the average revenue per user (ARPU) by upselling customers and offering more applications
- 3) reducing customer churn by offering greater choice.

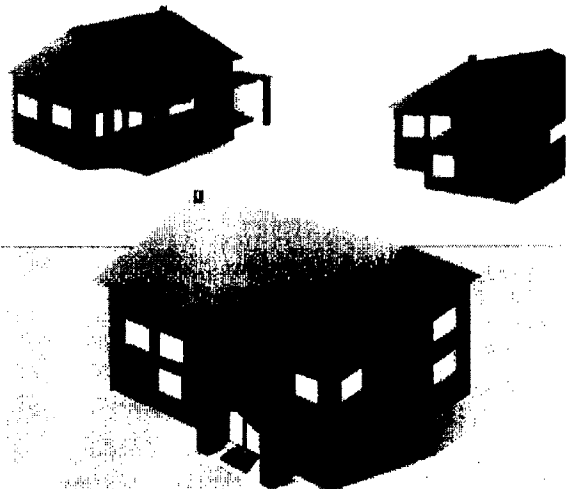


### **The Most Cost Effective Solution For Last-Mile Access**

Omnilux's patent pending optical wireless and Wi-Fi technology bridges the last mile gap by delivering guaranteed service levels of up to 100 Mbps with a very low initial investment and an average cost per deployment of less than \$500.

This breakthrough will allow for rapid broadband deployment in ways never before possible.

[Learn more about the Omnilux Solution](#)



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software and services?

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Boingo™ Wi-Fi service is available in over 800 Hot Spot locations covering 300 cities and 43 states. The Boingo Wi-Fi network includes full or partial coverage in numerous US airports, service in the lobbies of hundreds of major hotels such as the Four Seasons, Hilton, Marriott, Wyndham and coverage at hundreds of cafes, coffee shops and free networks. Search the location directory below or in the Boingo client software to find a Wi-Fi location near you or where you are travelling.

**Country: (required)****City:**

surrounding area

**Category:  
(optional)****State: (required)**

Alabama  
Alaska  
Arizona  
California  
Colorado

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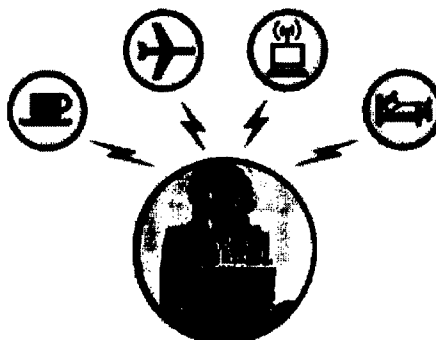


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- [What Does it Cost?](#)
- [How Does it Work?](#)
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## What is Boingo?

➔ **It's free software you can download now.**

Lets you know when you're in range of a high-speed wireless signal, or tells you where to find the closest one and lets you connect to free [Wi-Fi](#) networks. [Download it for free!](#)

➔ **It's a wireless service you can sign up for here.**

[Wi-Fi](#) access in [hundreds of hot spot locations](#) all across the country and world-class customer service. [Sign up today!](#)

➔ **It's the freedom of high speed wireless access from [hundreds of hot spot locations](#) across the country.**

With **Boingo™**, you'll enjoy convenient Wi-Fi access from airports, hotels, convention centers and cafes - without wires, plugs, or limitations.

Just click the **Boingo** icon on your laptop and - **Boingo!** - you'll be online and flying on one of the world's leading wireless broadband networks in seconds. You'll also get the best service and technical support available whenever you need it, wherever you go - by e-mail or phone.

**\*For a limited time, included with the Boingo Software you will also receive a FREE trial of our secure Personal VPN service, a \$30 value! This service encrypts your messages so you are free to use Boingo service in public spaces without worrying about hackers and snoops. To activate the VPN service, simply go to "My VPN" located under Settings on the Boingo Client and click on "Connect".**



## Boingo Software

**FREE Boingo software lets you:**

- "Sniff" for live [Wi-Fi](#) networks.
- Manage your connections at home, office & on the road.
- Searchable [Wi-Fi Location Directory](#).
- Connect to hundreds of free Wi-Fi networks.

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Cafe.com brings the latest advances in wireless Internet technology within reach of business and facility managers. Earn increased revenue from your customers by offering them wireless Internet access at your locations.

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**Cafe.com Wireless Internet Access Is For Everyone:*****Do you have a laptop or handheld device?***

Most laptops and handheld computers are capable of accessing the Internet wirelessly - just with the addition of a wireless Internet card.

***What is a wireless Internet card?***

A wireless Internet card is a network card that supports the "802.11b" wireless Internet protocol, a widely used and supported system for wireless Internet. 802.11b cards are available for PC and Mac platforms from a wide variety of computer retailers for between \$70 and \$99. The Apple Mac wireless Internet card is called an "AirPort" card.

***Where can you use the wireless Internet card?***

Wireless Internet-enabled laptops and handheld devices can connect to the Internet wherever a public wireless access point is available, including Cafe.com powered locations. Public wireless access points can already be found in thousands of locations across the U.S.A. Websites such as [www.wifinder.com](http://www.wifinder.com) are good places to search for wireless access points near you.

**Cafe.com offers three levels of wireless Internet access to customers:**

- Pre-paid per-minute access
- Unlimited per-day access
- Monthly subscription plans

- You can sign up for a user account from any Cafe.com-powered [location](#).

- [Click here for service pricing details](#)

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..T..Mobile..



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## Press room



### **T-Mobile, Starbucks and HP Rollout High-Speed Broadband Wireless Internet Access**

*World's Largest Wi-Fi Network Now Accessible in Approximately 1,200 Starbucks Locations in the United States and Europe*

SAN FRANCISCO, California - 08/21/2002 — High-speed wireless Internet access becomes faster, simpler and more convenient today as Starbucks Coffee Company (Nasdaq: SBUX), T-Mobile International, the wireless subsidiary of Deutsche Telekom AG (NYSE:DT), and HP (NYSE: HPQ) officially launch T-Mobile HotSpot service in Starbucks coffeehouses.

As easy as ordering their latte, Starbucks customers can check e-mail, surf the Web, watch streaming video or download multi-media presentations in the comfort of Starbucks via a fast, reliable standards based wireless Internet connection for notebook computers and Pocket PCs. Starting today, Starbucks customers can trial T-Mobile HotSpot service for free at approximately 1,200 Starbucks stores in the United States. An additional 800 Starbucks locations in the U.S. are scheduled to feature the service by the end of the year. With an eye toward global expansion, Starbucks and T-Mobile have also initiated a six-month pilot in select London and Berlin locations.

"This service is a natural extension of the Starbucks coffeehouse experience, which has always been about making connections with the people and information that are important to us over a cup of coffee," said Howard Schultz, Starbucks chairman and chief global strategist. "Mobile professionals across the globe have been waiting for just such an offering: high-speed wireless Internet access in a familiar and widely available location that keeps them connected while on the road, or between the home and office. It's the right service offered in the right environment."

T-Mobile HotSpot service uses standards based "Wi-Fi" (802.11b) technology and is easily accessible for Starbucks customers with a wireless-ready notebook computer or Pocket PC. Backed by T-1 connections in popular venues in the U.S., T-Mobile HotSpot service is reliable and fast enough to accommodate the full spectrum of applications from checking e-mail to multi-media video conferencing with a high-speed wireless connection as much as 40 - 50 times faster than standard dial-up Internet access.

As the preferred technology provider for Starbucks corporate headquarters and its network of retail stores, HP also introduces the new Wireless Connection Manager. The free, downloadable software makes it simple for mobile professionals to configure their wirelessly enabled notebook and Pocket PCs to automatically sense and connect to available wireless networks, making the move from home to office to Starbucks a breeze. The easy-to-use Wireless Connection Manager software will assist Starbucks customers in moving between T-Mobile HotSpot and other wireless networks in which they may connect. Starbucks customers can visit [www.starbucks.com/hotspot](http://www.starbucks.com/hotspot) to download the free HP software and order specially bundled HP mobile products such as Evo notebook computers, iPAQ Pocket PCs, and Wireless PC cards.

With today's announcement, the service is now available at Starbucks stores in Atlanta; Austin, TX; Boston; Connecticut; Denver; Dallas-Ft-Worth; Houston; New York; New Jersey; Philadelphia; Portland, OR; the San Francisco Bay area; and the Seattle-Puget Sound region. Additionally, stores in southern California, including Los Angeles; Chicago; Maryland; Pittsburgh; Virginia; and Washington DC, are scheduled to be enabled before the end of the calendar year. Customers can easily identify which of their favorite Starbucks have

broadband wireless Internet access by looking for the T-Mobile HotSpot sign near Starbucks entrances or by visiting Starbucks and T-Mobile's websites.

The service is also available in select Starbucks stores in London and Berlin. Additional cities will be added to the European pilot over the next several months.

John Stanton, Chairman, T-Mobile, U.S. Operations, said T-Mobile HotSpot service demonstrates how T-Mobile is using its leadership position in wireless data to deliver on its "Get More" Promise(R) to customers, enabling them to use the most current innovations in wireless services to get more from life(R). "Our relationship with Starbucks and HP demonstrates T-Mobile's commitment to deliver on the promise of fast, reliable, and convenient wireless Internet access," said Stanton. "Today, T-Mobile's HotSpot service represents the largest carrier-owned 802.11b network in the world and a powerful, comprehensive service offering when combined with the reach of our nationwide GSM/GPRS voice and high-speed data network. T-Mobile will continue to form alliances with great partners, like Starbucks, to deliver what customers crave from wireless data services—coverage where they want it, and speed when they need it."

"HP's vision is to eliminate the boundaries of mobile computing, making wireless access fast, easy and rewarding," said Michael Capellas, president of HP. "Not only does HP offer the broadest array of innovative mobile technology today, but we're collaborating with Starbucks and T-Mobile on future technologies to deliver a constant stream of wireless products and places to enrich the mobile experience for our mutual customers worldwide."

To connect, customers need a T-Mobile HotSpot account and Wi-Fi capability for their notebook computer or Pocket PC. To log in to the service and establish a connection, customers with a properly configured notebook or Pocket PC simply need to launch their Internet browser from within a participating Starbucks and login.

T-Mobile is offering Starbucks customers a Free Day Pass, available in participating Starbucks locations, to get a free one-time 24 hour trial of the wireless broadband service. Additionally, T-Mobile offers a variety of Internet access service plans to accommodate the needs of all customers, including National and Local Unlimited monthly subscription plans, as well as Prepay and Pay-As-You-Go plans. Rate and location information can be found at [www.t-mobile.com/hotspot/](http://www.t-mobile.com/hotspot/).

According to the Yankee Group 2002 Corporate Wireless Survey, almost 25 percent of all enterprise workers are considered mobile, spending more than 20 percent of their time away from their workspace. This equates to approximately 40 million mobile professionals in the U.S. who still want and need access to their e-mail, the Internet, or their corporate intranet. A number of corporate customers in the U.S. are participating in a pilot to extend faster and more affordable remote access options to their mobile workforces. Starbucks customers, including KPMG Consulting Inc., John L. Scott Real Estate, and others, have found that the service keeps them connected while they're away from the office-offering them a familiar, comfortable location, with the benefit of a high-speed Internet connection.

"Today's mobile executives want the flexibility of wireless Internet access," said Michael Surface, managing director for Retail/Wholesale, KPMG Consulting, Inc., which also has Starbucks as a client. "We are seeing growing interest from consumers for breakthrough wireless capabilities. Starbucks has pioneered this space by offering this technology in its retail stores, enabling consumers to stay connected while on the road."

#### **About Starbucks Coffee Company**

Starbucks Coffee Company is the leading retailer, roaster and brand of specialty coffee in the world. In addition to retail locations in North America, Europe, the Middle East and the Pacific Rim, Starbucks sells coffee and tea products through its specialty operations, including its online store at Starbucks.com. Additionally, Starbucks produces and

sells bottled Frappuccino(R) coffee drink, Starbucks DoubleShot(TM) and a line of superpremium ice creams through its joint venture partnerships. The Company's other brands enhance the Starbucks Experience through best-of-class products: Tazo Tea Company offers a line of innovative premium teas, and Hear Music produces and distributes a line of exceptional compact discs.

**About HP**

HP is a leading global provider of products, technologies, solutions and services to consumers and businesses. The company's offerings span IT infrastructure, personal computing and access devices, global services and imaging and printing. HP completed its merger transaction involving Compaq Computer Corp. on May 3, 2002. The company would have had combined revenue on a pro forma basis with the Compaq transaction of approximately \$81.1 billion in fiscal 2001 and has operations in more than 160 countries. More information about HP is available at <http://www.hp.com>.

**About T-Mobile, U.S. Operations**

Based in Bellevue, Wash., VoiceStream Wireless Corp. is one of the fastest growing wireless service providers in the United States. Its new T-Mobile brand debuted in the U.S. with the launch of service in California and Nevada in July and VoiceStream will transition its current VoiceStream brand to T-Mobile nationwide by the end of the year. VoiceStream is committed to providing the best value in wireless service through its "GET MORE" Promise(R) to provide customers with more minutes, more features and more service than any other wireless provider. VoiceStream is a leading provider of standards based wireless Internet access for mobile users operating the largest all digital GSM/GPRS voice and high speed data network in the country and the largest carrier owned 'Wi-Fi' 802.11b wireless broadband, (WLAN) network in the world, with service in popular Starbucks coffeehouses, American Airlines Admirals Clubs, and select airport locations. VoiceStream is a member of the T-Mobile International group, the mobile telecommunications subsidiary of Deutsche Telekom (NYSE "DT"). Through its subsidiaries and other investments, Deutsche Telekom serves more than 69 million wireless subscribers worldwide, ranking it one of the top three wireless carriers globally. For more information, visit the company web site at [www.t-mobile.com](http://www.t-mobile.com).

**About T-Mobile International**

T-Mobile International, one of Deutsche Telekom AG's (NYSE:DT) four strategic divisions, is one of the world's leading international wireless communications providers. Deutsche Telekom subsidiaries and affiliated companies today serve more than 69 million mobile customers worldwide. T-Mobile is the first transatlantic mobile communications provider utilizing the digital GSM wireless technology standard, giving customers the choice of using the same phone and number when traveling internationally. For more information about T-Mobile International, please visit [www.t-mobile-international.com](http://www.t-mobile-international.com).

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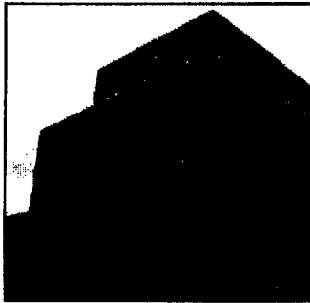


.. T-Mobile



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## Press room



### **T-Mobile and Borders® to Offer 802.11b Wireless Broadband Internet Access for Borders Books and Music Customers Nationwide**

*T-Mobile HotSpot<sup>SM</sup> Customers GET MORE<sup>SM</sup> Premium Locations through Nation's Largest "Wi-Fi" Network*

BELLEVUE, Washington / ANN ARBOR, Michigan - 10/10/2002 — T-Mobile USA, Inc., the wireless subsidiary of Deutsche Telekom AG (NYSE:DT), in partnership with Borders Group, Inc. (NYSE:BGP) today announced an agreement to provide Borders customers high-speed broadband wireless Internet access in Borders Books and Music locations nationwide via T-Mobile HotSpot<sup>SM</sup> service. Currently available in over 1,600 convenient locations across the country, T-Mobile HotSpot service allows customers with a wireless-enabled laptop or PDA to access the Internet or Intranet at super fast speeds. Customers can indulge personal interests and work applications including checking e-mail and doing online research to reading book reviews and experiencing rich multimedia audio and video services.

With today's announcement, T-Mobile HotSpot customers GET MORE<sup>SM</sup> easily identifiable locations to access the Internet away from their home or office, and Borders customers get the convenience of a high speed wireless Internet connection to complement their visit to Borders stores and cafes. The T-Mobile HotSpot service will be available in approximately 400 Borders Books and Music locations beginning in the first quarter of 2003 with Borders stores in California being the first to offer the service.

"We see the addition of T-Mobile HotSpot wireless Internet service to our bookstores as a welcome extension to the shopping experience for our customers," says Tami Heim, president of Borders Stores and Borders Online. "In addition to offering books, music and movies, we invite our shoppers to come to our stores to read, meet with friends, or even just unwind at Café Borders. Allowing our customers to do those things and still stay connected to their world is a great addition to our service offering."

"Borders is an excellent compliment to our rapidly growing portfolio of T-Mobile HotSpot locations," said Robert Dotson, President and COO, T-Mobile USA. "As part of our GET MORE<sup>SM</sup> service offering, we're committed to making high speed, reliable wireless Internet access widely available at easily recognizable places our customers frequent."

T-Mobile HotSpot represents the largest, fastest growing network of standards based "Wi-Fi" (802.11b) access points across the country, with over 1,600 service locations to date including select Starbucks coffeehouses, airports and airline clubs.

#### **About T-Mobile, USA**

Based in Bellevue, Wash., T-Mobile USA operates the largest GSM/GPRS voice and high-speed wireless data network in the United States, covering over 200 million people. T-Mobile also operates a "Wi-Fi" 802.11b wireless broadband (WLAN) network in more than 1,600 public locations including Starbucks coffeehouses, American Clubs, Airlines Admirals Clubs, and select airports nationwide. T-Mobile is a member of T-Mobile International group, the mobile telecommunications subsidiary of Deutsche Telekom (NYSE: DT), and one of the top three global wireless carriers in the world. Through its GET MORE<sup>SM</sup> promise, T-Mobile is committed to providing the best overall value in wireless communications with more minutes, features and service than any other carrier. For more information, go to [www.t-mobile.com](http://www.t-mobile.com).

**About Borders Group, Inc.**

Borders Group, Inc., (NYSE: BGP) is a leading global retailer of books, music, video and other information and entertainment items with stores in the United States, United Kingdom, Australia, New Zealand, Singapore, and the commonwealth of Puerto Rico. A FORTUNE 500 company headquartered in Ann Arbor, Mich., Borders Group employs 32,000 worldwide and operates over 385 Borders domestic superstores, 25 international Borders stores, 36 Books etc. locations and approximately 800 Waldenbooks stores. Teamed with Amazon.com, the company also offers online shopping through [Borders.com](http://Borders.com).

More detailed information for journalists is available at [www.bgiimediacycenter.com](http://www.bgiimediacycenter.com). Financial data is hosted on [www.bordersgroupinc.com](http://www.bordersgroupinc.com) and information on Borders stores is available through [www.bordersstores.com](http://www.bordersstores.com).


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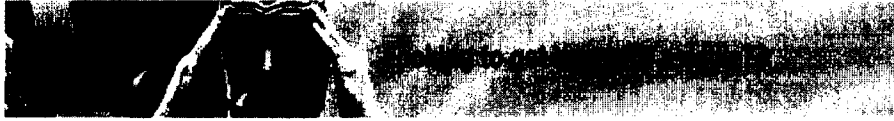
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## **Verizon launches first U.S. '3G' network**

**NEW YORK (CNN) --Verizon became the first company Monday to launch a so-called "third generation" or "3G" wireless telephone network in the United States.**

It is an upgraded telecommunications network that makes it possible for subscribers with specially equipped wireless phones to access the Internet and other online services at high connection speeds.

Sprint is expected to offer similar 3G services within a few months, and AT&T has said its 3G network will be up and running by the end of the year.

Initially, the Verizon service is available in three areas: a corridor that runs from Norfolk, Virginia to Portland, Maine; the Salt Lake City area; and the San Francisco/Silicon Valley area.

Also on Monday, Verizon began selling two new telephone devices capable of accessing the 3G network. Neither is a stand-alone device. One is a handset that retails for about \$80 and has to be cabled to a computer. The other is a PC card that fits into a computer or personal digital assistant (PDA) and essentially works like a wireless modem, connecting those devices to the network. The card sells for about \$300.

3G technology has been touted by analysts as the "next big thing" in wireless phones, allowing users to send documents, surf the web, view graphics and streaming video, download music and even video-conference over mobile phones.

The Japanese company NTT DoCoMo launched the world's first 3G network in Japan last September. That service is somewhat more advanced than the Verizon version, as its 3G telephones work as stand alone devices and don't have to connect to a computer or PDA.

### **Will it catch on?**

Verizon says its 3G service pricing plan for existing customers will start at \$30/month on top of regular monthly fees.

Analysts say numerous companies are developing software products that will provide content to 3G phones -- games, business applications, and sports and entertainment programming such as sports reports and newscasts.

However, critics caution that potential users might shy away from 3G phones as most of these services are not widely available yet. Also, it is unclear is how many customers will be interested in viewing content delivered on a wireless phone's small LCD display screen.

By the end of the year, Verizon hopes that half of its nationwide network will be switched over to support 3G

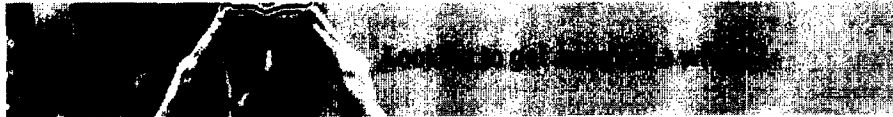
service.

Existing wireless phones will work on a 3G network, but will not be able to take advantage of the enhanced services.

**Find this article at:**

<http://www.cnn.com/2002/TECH/ptech/01/28/verizon.3g>

☐ Check the box to include the list of links referenced in the article.





## Wi-Fi goes to Washington

A new technology could not only restart economic growth but also help connect everyone, everywhere to the Internet—at low cost.

**REED E. HUNDT, STAGG NEWMAN, AND JOHN E. RICHARDS**

*The McKinsey Quarterly, 2002 Number 4*

Remember when technology-based start-ups were going to put established companies out of business? The surviving incumbents are now having a last laugh. But their *schadenfreude* may be short-lived in the telecommunications industry because a new technology called Wi-Fi (wireless fidelity) is threatening the business models of the mobile carriers, the phone gear makers, and the providers of high-speed DSL and cable modem services.

Wi-Fi—known among techies as 802.11, a reference to its underlying technology standard—is an alternative means of Internet access. Simply hook up an inexpensive Wi-Fi base station (chip plus transceiver) to a high-speed Internet connection such as DSL, a cable modem, or a T1 line and place this base station within a couple of hundred feet of a house. All users in the vicinity who have a very inexpensive Wi-Fi device in their PCs or PDAs can then share low-cost, high-speed access to the Internet, without having to pay individually for more expensive dedicated DSL or cable modem service.

Even better, with exciting new technologies such as mesh and ad hoc networks, improved Wi-Fi devices could create overlapping Wi-Fi networks in hotels, airports, office buildings, and malls. Strings of linked Wi-Fi networks can stretch through apartment buildings, campuses, and neighborhoods. Forget about digging up streets for fiber to every building or about erecting forests of towers; Wi-Fi can stretch the fabric of Internet connectivity, cheaply and painlessly, over any community to points where traffic is aggregated onto high-speed fiber backbone networks.

Wi-Fi exploits the spectrum used by gadgets such as cordless telephones and microwave ovens—airwaves that haven't been auctioned or allocated to an exclusive user. This is the proverbial free lunch of spectrum. At last, Internet access can be easy, cheap, always on, everywhere. And Wi-Fi access is fast: indeed, with a fiber rather than a DSL or cable modem connection from the backbone network to the Wi-Fi base station, the transfer speed of Wi-Fi can be faster than the typical speeds of those technologies.<sup>1</sup> A fiber connection of this sort would make it easy to download, stream, and swap movies—or vast volumes of corporate data—not only to computers but also to a new generation of flat screens equipped with Wi-Fi chips. Users will be able to make telephone calls by speaking into microphones in their lapels or on the edges of their computer screens. Guglielmo Marconi, the inventor of wireless communication, will have the last laugh on Alexander Graham Bell, the inventor of the telephone.

What's the rub? Telephone companies could find that Wi-Fi will replace the additional, or "discretionary," phone lines that residential and business customers have had installed to supplement the traditional single "lifeline" connection. That change alone would probably make every telephone company in the United States unprofitable. Mobile carriers too could lose a substantial portion of their revenues (particularly future wireless data revenues) to Wi-Fi networks.

For the mobile and wireline phone companies, the market-based reaction would be to embrace the new technology and extend its applications. But the likely alternative—though one that would greatly serve the economy and consumers—is for these companies to use

one that would poorly serve the economy and consumers—is for those companies to use the power of governments to slow or thwart Wi-Fi's advance. Already, in Taiwan only communications providers licensed by the government can operate commercial Wi-Fi networks. Some European countries appear to have similar, albeit ambiguous, regulations. Under such rules, Starbucks, which has put Wi-Fi connectivity into many of its shops, may not be able to charge an additional nickel a cup to patrons who want to have the Internet along with their coffee. Meanwhile, in the United Kingdom, regulators in effect prohibited service providers from offering commercial Wi-Fi services but recently took the wise course and reversed this rule, and BT has already indicated that it will offer them.

Wi-Fi might also be squelched if governments decided to favor other industries that use the same radio frequencies. In Florida, one ham-radio operator has gone to court to shut down a Wi-Fi operator on the grounds that the apartment dwellers using this form of wireless Internet access were interfering with his radio. The electrical-lighting industry has petitioned the US Federal Communications Commission (FCC) to permit the use of the spectrum in a way that would create difficulties for Wi-Fi. And satellite operators have complained that Wi-Fi broadcasts will obstruct signals to and from satellites.

Such spectrum battles are chronic at the FCC. Each of them will give the government a choice: to promote Wi-Fi or to restrain it. Even if the FCC sided with Wi-Fi on all issues of competing use, consumers would still have to reckon with the possibility that the government might protect existing communications services by forcing Wi-Fi to meet regulatory requirements for the security of signals and the quality of service. Actually, meeting these standards would be a laudable goal, but it should be achieved through competition and innovation, not government mandates. Imposing such requirements is a time-tested regulatory way of deterring competition and delaying change.

Finally, the biggest risk is simply that the FCC might fail to allocate enough spectrum for free, unlicensed Wi-Fi and its many offshoots. If this new technology sweeps the country and the globe, as experts claim it can, spectrum auctions might become unnecessary to promote competition. Looking beyond auctions for revenues, the US Treasury Department might have to settle for reasonable taxation of a newly burgeoning information sector. But if governments become addicted to auction revenues, they may resist the allocation of free airwaves to Wi-Fiers.

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Change is the elixir of growth in any economy, especially in the high-tech and innovation-driven economy of the United States. Now is the time for the US government to embrace Wi-Fi and, for that matter, many related new technologies. Let inventiveness again lead the country to new plateaus of high growth and to new solutions for the problem of bringing everyone into the Internet age.

**Notes:**

Reed Hundt, the chairman of the FCC from 1993 to 1997, is now a senior adviser to McKinsey; Stagg Newman, chief technologist of the FCC from 1998 to 1999, is a consultant in McKinsey's Washington, DC, office; John Richards is a consultant in the Silicon Valley office.

<sup>1</sup>This approach, however, wouldn't necessarily cut the DSL and cable providers out of the business, since these companies own most of the backbone networks and would therefore be the natural providers of fiber connections from them to Wi-Fi base stations.



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## **Sprint Chairman William T. Esrey Outlines Future of Wireless in CES Closing Keynote Address**

JANUARY 10, 2002  
 LAS VEGAS, NEV,

*For more information on CES and Sprint's 3G technology, visit the Sprint at the Consumer Electronics Show [online press kit](#).*

In the [closing Keynote Address of the 2002 Consumer Electronics Show](#) here, Sprint Chairman and Chief Executive Officer William T. Esrey outlined the company's plans to be the first U.S. wireless carrier to deliver third generation (3G) wireless services nationwide on its network beginning this summer. On-stage demonstrations brought to life how Sprint plans to build upon its unsurpassed clarity in voice services to make 3G data simple, accessible, fast and clear for consumers and businesses, clear across the country.

From a family who can use their phone to instantly take and email Grandma a digital photo of the kids playing at the park, to the business traveler who needs on-the-fly directions to help them make their meeting on time, Sprint demonstrated a world where expanded network capabilities would allow carriers to deliver new services that would further ingrain wireless communications into our daily lives.

Esrey, speaking at the world's largest consumer electronics trade show, also announced a new wireless phone partnership with Hitachi, Ltd., a new e-mail solution for enterprise customers; new 3G phones from Sanyo and a wireless gaming pact with videogame publisher THQ.

Third Generation Wireless, or 3G as it's known, will allow Sprint to offer data services at peak speeds of 144 kilobits per second this year and over 3 megabits per second within two years, eclipsing standard 56 kbps dial-up Internet connections and matching or exceeding current forms of broadband access. The result, said Esrey, will be a network that will dramatically enrich the whole wireless experience, providing capabilities that once were limited to a home or office PC.

"Most people aren't interested in simply replacing lower tech with high tech," Esrey told the crowd. "But they are vitally interested in useful innovations -- in new, easy-to-use technology that creates real value. That's been one of our guiding principles in developing Sprint's 3G network."

Esrey then launched into a series of demonstrations that illustrated the power and flexibility the next generation of wireless services will bring to consumers. Sprint demonstrated services that promise to clearly differentiate its wireless offerings from the rest of the industry, including:

- "Wireless imaging" features, which will allow users to take and send digital photographs using their Sprint PCS phones and/or special hardware attachments.
- Advanced messaging capabilities that will allow users of most any 3G-enabled Sprint PCS device to receive and view file attachments and more.
- Location-based services such as driving directions, local restaurant listings and more that are based on a user's physical location.
- Sprint PCS Wireless Web applications that vastly improve upon today's wireless Internet services by providing graphics, motion and attachments while connecting on 3G devices. These devices include the futuristic 3G Sprint PCS Phone by Sanyo, which Esrey unveiled during his keynote, and another developed with Hitachi through the new relationship Sprint announced earlier this week.
- Increased wireless gaming options that take today's current wireless games from their infancy to a new level of realism similar to popular handheld gaming platforms with Java-based applications and partnerships with leading game makers like THQ.

"The promise of 3G is no longer just a promise," Esrey told the audience. "The fact is, while many wireless operators in this country have been investing millions -- even billions of dollars in frequency licenses and CDMA technology -- Sprint made those choices and those investments five and more years ago. As a result, we've been able to focus our 3G investments in products that we can bring to market before any of our competitors. I'm pleased to tell you that our customers will gain the advantage of that head-start when we roll out the first of our third-generation products beginning this summer."

Esrey also touted the company's first high-profile sneak peek of its 3G network at CES, making it the first U.S. carrier to actually demonstrate 3G products and services in action to the general public.

Earlier in the week, Sprint unveiled a live demonstration of its 3G services for the first time ever outside its laboratories. CES visitors to Sprint's "Third Generation Network Experience" showcase vehicle could catch a glimpse of Sprint PCS Business Connection, which is expected to allow business users "always-on" connectivity to their corporate network and Intranet information over Sprint PCS' nationwide wireless network. The live demonstration showed a laptop equipped with a 3G Sprint PCS Wireless Connection Card that could reach peak speeds of 144 Kbps to access Internet and corporate applications. As Sprint unleashes 3G services nationwide the middle of 2002, high-speed connections will be available on a variety of devices from wireless modem-equipped PDAs to laptops and third generation wireless phones.

Videotape copies of Bill Esrey's keynote address are available. Through Friday, January 11, please contact the CES pressroom at 702-943-4001. After January 11, please contact Steve Lunceford at 202-585-1955 or Dan Wilinsky at 913-762-7017.

**About Sprint**

Sprint is a global communications company serving 23 million business and residential customers in more than 70 countries. With more than 80,000 employees worldwide and \$23 billion in annual revenues, Sprint is widely recognized for developing, engineering and deploying state of the art network technologies, including the United States' first nationwide all-digital, fiber-optic network. Sprint's award-winning Tier 1 Internet backbone is being extended to key global markets to provide customers with a broad portfolio of scaleable IP products. Sprint's high-capacity, high-speed network gives customers fast, dependable, non-stop access to the vast majority of the world's Internet content. Sprint also operates the largest 100-percent digital, nationwide PCS wireless network in the United States, already serving the majority of the nation's metropolitan areas including more than 4,000 cities and communities. For more information, visit the Sprint web site at [www.sprint.com](http://www.sprint.com).

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## Remarks at Internet World Fall 2002

William T. Esrey, Chairman and CEO  
Sprint

New York City, NY  
October 02, 2002

About a month ago the magazine U.S. News and World Report printed an entertaining cover story called "The Art of the Hoax." From snake oil salesmen and faith healers, from Ponzi schemes to searching for buried pirate treasures, the article described the biggest and most elaborate hoaxes, myths and rumors ever concocted.

The article raised the question of whether, today, the Internet, with its ability to move unfiltered information around the world in only a few seconds, serves as an unintended accomplice to those who create the scams and generate the rumors. Whether there are more hoaxes, myths or rumors today because of the Internet is open to debate, but one thing that appears certain is that the growth of the Internet has led to the spread of a new kind of virus that seems to affect many people. Labeled the "gullibility virus," this bug infiltrates normal, rational individuals and causes them to believe anything they read or view on the Internet no matter how much it defies sensibility or logic.

As the US News article points out, when confronted with the seemingly outlandish, we need to ask ourselves: "when does a good deal become too good to be true, and where does blind acceptance end and common sense begin?"

Maybe these questions should have been asked a few years ago in our industry, before myth overtook reality -- and investors, media, and the public at large were blinded by the promise of the "new" Internet-driven economy.

The California gold rush mentality that was spawned probably reached its peak in the spring of 1999, when, according to Forbes Magazine, more than two dozen venture capitalists vied for eight weeks for the --quote -- privilege to fund seven "pet" portal companies -- unquote. None of those companies or their human owners had a business plan, let alone a clue, about how they were going to be successful in the "pet" portal business. Yet the venture capitalists, employees of these firms, the media and the public jumped in for the ride as they sought to attain the financial nirvana they believe was offered.

In some ways, the business environment in the late 90s reminded me of what our society went through in the late 60s. But rather than experimenting with mind-altering chemicals, the drug of choice in this case was venture capital dollars. New telecom entrants were fed by a flow of almost unending cash and credit under the belief that anything that was a dot-com had to be worth investing in and building capacity for. The result was a glut of fiber and network capacity based on the hope of serving the pet portals and other equally outrageous ventures that captured the imagination.

But, as we now know, it was an illusion. While there is no doubt that the Internet has had a major impact on the way we do business, the "new" economy was, and is, more myth than reality. The laws of economics, of supply and demand, of finance, still hold true. The fact is, there has to be a market for the services you provide.

Without any customers to pay the freight for the irrational spending to build networks, carriers resorted to irrational pricing in an effort to attract any customer at any price. But this action created a vicious cycle because if you price below your long-term costs, you can not possibly ever recover your initial investment. When the economy turned south and investment capital dried up seemingly overnight, the new entrants collapsed under the weight of debt and were forced into bankruptcy.

But the carnage didn't stop there. Some established carriers fell victim to the myth. But rather than stop, acknowledge error and adjust their business strategies as the marketplace changed, they perpetrated their own hoax. What was left was a cloud of fraud and deception on a scale almost unimaginable as well as a lingering stench that has poisoned our industry. Of the major companies in the interexchange business, there are only two today that are not in bankruptcy or under civil or criminal investigation: AT&T and Sprint. This is a truly unbelievable outcome from the world we lived in just three years ago.

I want to take just a moment to examine the impact of WorldCom's fraud on the telecom industry. As Fortune magazine said in a story last July, for a time WorldCom seemed to have some kind of secret formula for producing margins that rivals could not match. We kept asking ourselves what we were doing wrong because we couldn't generate the numbers WorldCom reported. The ripple effect across the industry was for competitors to reduce prices to a nearly unsustainable level. But as we've discovered, the margins were a hoax, but the destructive affect on our industry was very, very real.

To put it in simple financial terms, if WorldCom had actually priced to realize the profit it claimed it generated in

2001, and Sprint had priced at that same level, our long distance operation would have generated over half a billion dollars in additional operating income last year.

What would we have done with those profits? First, we would have generated a meaningful shareholder return. Second, we would have been able to invest back into the growth areas of the business. For business customers, products like IPVPN and managed network services. On the consumer side, it could be voice-activated dialing from home, entertainment or similar services. With this type of investment you create a virtuous cycle. Well thought out investment meets a demand, creates additional investment, and it goes on. And these are success-based capital expenditures, not building a network to serve pet portals. It is capital that is able to create a return for shareholders and add value to customers.

For the telecom industry, the cost of these fraudulent transgressions, ill-defined investments and capacity glut was staggering. Two trillion dollars of market valuation lost, more than 500,000 jobs eliminated industry-wide, and trust, the foundation from which business and investment is built, was shattered.

Now it's time to pick up the pieces.

I don't believe there is a magic recipe for recovery. But despite the problems, I am optimistic about the future of this industry. The house is being cleaned, which is the first step to regaining investor confidence and public support. I see more discipline being exercised in terms of pricing, more efficient management of capital and more effective suppliers. I also see a dramatic evolution in wireless services in the years ahead. Recovery won't happen overnight, but I am confident that there is opportunity, that this ship will be righted, and it will sail again.

As I look ahead, I think it's important to debunk a myth that envelops the industry -- that telecom is a dying business. What nonsense! Despite the travails affecting it, telecom continues to play an expanding role in both the national and world economies. In fact, the sector is forecast to grow at more than a 4 percent compounded annual rate through 2005, a rate faster than most other segments of the economy. So, contrary to what you may read or hear, telecom still is an expanding industry that remains vital to our nation's economic health and future.

As I said, we are getting our house in order. In every industry - fledgling or mature - there will always be a natural selection that eliminates the companies who are most vulnerable and defines the enduring players. The companies that live through it have the right assets, sound business plans, good management, strong brands, solid financial footing, products customers want, and the ability to adapt to change.

As harsh as it sounds, industry shakeouts are as good as they are inevitable. Eliminating lesser companies with wobbly business plans and faulty business ideas makes the rest of the industry more vibrant...better able to meet the demands of the market, better armed for changing economic conditions... and more resilient.

In fact, as basic tried-and-true business principles regain control of decision making, and as you look at the true fundamentals of our industry, you can see the start of a turnaround. A number of ingredients for a healthy industry are now in place.

What will the successful company in the telecom industry look like? In particular, if I were placing bets on companies that will survive going forward, I'd bet heavily on companies like Sprint. I am increasingly confident that companies that take a more integrated approach to meeting customer demand - offering not just wireline or wireless, not just voice or data, but a full complement of services - will outlive the competition and prosper.

I believe the model for the future of telecommunications is total access solutions. Total integration. An abundance of services seamlessly strapped together in a logical fashion from a company that has the assets, the vision and the ability to do it. Total access solutions is where the industry is going and, more importantly where it needs to be.

Look first at technology. For starters: We are going to see an increase in voice and data services over packet-based transport; 2) we'll see an increasing migration to broadband wireless; 3) we'll have 3G CDMA, 2G MMDS; 4) we'll benefit from increased device processing power; 5) we'll see smaller and sharper displays, and 6) we'll have open standards that enable high performance, seamless networking across LAN and WAN environments.

In the regulatory environment, we have regulatory mandates for wireless number portability and the likelihood of relaxed federal regulatory policies governing telecom overall.

Conventional wisdom calls for consolidation to improve scale and scope and to fill competitive gaps. The demise of new competitive entrants will continue. Containing capital expenditures to maintain profitability will continue to hamstring expansion plans. Strong competition from cable companies in broadband data will continue to provide intense competition in DSL and data markets for ILECS.

And finally, customers' needs will continue to change. Customers will continue to demand access to enterprise applications in the home, at work, in between -- in fact, everywhere. The desire for one-stop shopping and end-to-

end services will grow. Customers will demand more control of mobile and portable devices, and they'll increasingly adopt mobility solutions that substitute for wireline. In my book, these trends are not illusory, but customer-driven and an inevitable outgrowth of a changing society.

Against this backdrop, Sprint will play out a plan to aggressively maximize the value driven by integrated wireless/wireline solutions to deliver on the promise of Total Access Solutions -- a market opportunity that analysts estimate will be worth 40 billion dollars over the next three years.

So far, we've identified several efforts aimed at the addressable enterprise market segment. Let me give you some highlights on a few of these:

- Number one, Mobile Applications Solutions --hosted and managed applications enabling real time sales and customer data access anywhere, anytime.
- Two -- Mobile Collaboration Services --hosted and managed collaborative tools enabling your employees to manage their calendars and e-mail from anywhere, anytime using the handheld device of their choice.
- Three -- Extended Office Networks --secure, remote access to your corporate data anytime, anywhere. Our new PCS Vision services are a great example.
- And Four --Integrated Campus Network -- integrated wireless and desktop phone and wireless data access that gives your employees the freedom to work anywhere within the work environment.

What do they have in common? Powerful networks integrated into one customer satisfaction through multiple capabilities in multiple locations, bandwidth on demand, always on access. And one company to deal with for all of it.

And at Sprint, we are only beginning to push the envelope in terms of building alliances with other companies -- ensuring we are able to provide total access solutions, whether it is a complete migration to IP-based services or a solution that creates a completely wireless data environment.

The examples I've given here are strictly business to business, but the consumer possibilities are also quite promising.

People want to be able to connect from wherever they are -- from their home or office, from the road or the airport -- even from the beach or golf course. Consumers want wireless data because they want to be able to do what they normally do today -- read email, open attachments, view a spreadsheet -- outside the confines of their homes or offices. They want to use wireless data to conduct their business, and also to do all of life's other chores, like personal banking, comparative price shopping and exchanging family photos.

The introduction of PCS Vision last month is a great illustration of how Sprint is delivering on consumers' wish list for anytime, anywhere access.

In developing PCS Vision, Sprint has launched the world's largest Third Generation network with seamless services and became the first U.S. carrier to deliver 3G nationwide. Our CDMA path has enabled us to make the transition with only minor, cost-efficient changes to the network.

The technology itself is state-of-the-art, but what is most exciting is the access the technology allows -- access to information, to entertainment and to other people with greater mobility, convenience, speed, and the clarity for which Sprint is known.

Let me give you some specifics, starting with speed.

PCS Vision is *fast*, with average mobile data speeds of 50-70 kbps? comparable to or faster than what most Americans have at home. Peak speeds run up to a perceived 300 kbps using compression techniques.

PCS Vision is *packet-based*, so you're always connected? your information and entertainment are always available.

PCS Vision is *efficient*, utilizing our completely new network deployed in a single frequency band nationwide, and simultaneously bringing a substantial increase in voice network capacity.

And, while our competitors must add spectrum as they migrate to 3G, we have enough for the foreseeable future, meaning PCS Vision will *stay* efficient.

Further, PCS Vision is *consistent*. It will work in exactly the same way, everywhere on the Sprint wireless network.

Whether people want to communicate, access information, be entertained, or shop, PCS Vision facilitates those activities, giving customers the voice and the data connections they need, when they need them, in both their

personal and professional lives.

And uniquely, PCS Vision does that by delivering clarity you can see and hear.

Now consider PCS Vision as a major part of a broader Total Access Solution from Sprint.

To illustrate, consider one day in the not-so-distant future. Let's say you are on the phone at home but you have to leave for an important meeting. You don't want to cut this conversation short, so you simply head for your car with your handset.

As you drive off, the call, which originally was connected over Sprint's fixed wireless network, is now seamlessly switched to the PCS Vision wireless network. Since it is a long-distance call, it continues to be carried over Sprint's 100-percent digital fiber-optic network.

As you get farther from home, you realize you're low on gas. The area is unfamiliar to you, so you put that call on hold for a moment and verbally query your phone for the location of the nearest gas station. The location-based service from the PCS Vision network feeds the information back to you through a speaker feature in your phone.

Ten minutes later, you are still talking as you pull up to the office building that is your destination. The PCS Vision wireless network, using notification services, automatically signals your phone that you have an urgent message: your meeting has been delayed 30 minutes.

Thankful for the extra time and still on your phone call, you arrive to the conference room in plenty of time to boot up your laptop. Using an aircard in your laptop, which either uses the Sprint 3G wireless network or inter-operates with the building's wireless LAN, you are connected via Sprint's secure Virtual Private Network to your company's intranet. Accessing your information over Sprint's IP backbone, you download the latest version of the multi-media presentation for the meeting, pulling the file from a server that is hosted and managed by a Sprint Internet Center. As you settle into the conference room, you say good-bye to your caller.

That is our vision at Sprint. One seamless, total communications experience. And it's no illusion.

In closing, let me reiterate -- I think the best is yet to come, but it will come to those who treat the future differently, who exercise discipline, who are ethical and who set high standards. We can regain investor trust and the trust of the public. At Sprint, we have a clear vision of where we are headed. We have the expertise to make it happen. And we have the financial ability to accomplish it. It is a vision of a world no longer restricted by lines and cords, where you can move from your office to your home, from your home to anywhere you want to be -- with total, uninterrupted, fast and secure communications.. To me, it's the model of the future for this industry. A model strong enough to survive and thrive, and a recipe for recovery and success.

Thank you.

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## Residential Broadband: Cable Modem Remains King

### Executive Summary

*As regulatory hurdles continue to affect incumbent local exchange carriers' (ILECs') deployment of digital subscriber line (DSL) services in new markets, cable operators continue to capitalize on greater availability and faster provisioning of cable modem service to widen their lead in the residential broadband race. The net effect will be a broadband market in which cable modem providers—primarily the multiple system operators (MSOs)—will remain the undisputed leaders in residential broadband access over the next five years and beyond (see Exhibit 1).*

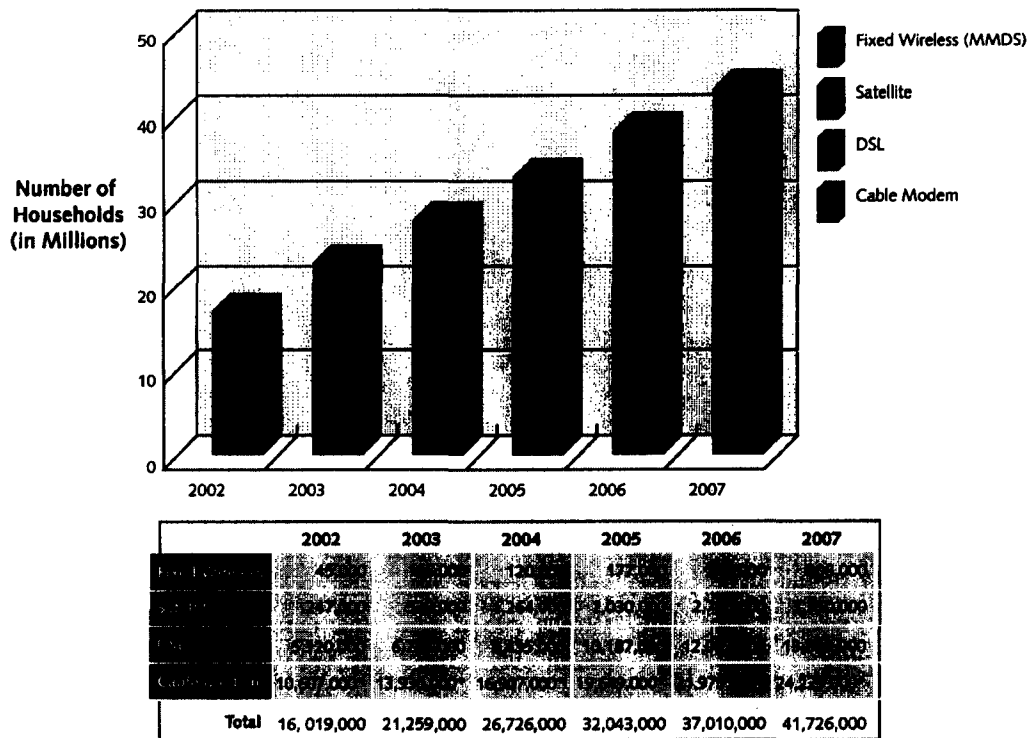
*By slowing down their broadband rollout, the regional Bell operating companies (RBOCs) and other ILECs are essentially conceding the residential broadband space to the MSOs. The RBOCs contend that it is not economically viable for them to bear all the costs of infrastructure deployment and then have to share those networks with competitors. Unless the RBOCs are given regulatory relief from making their networks accessible to their rivals, they will continue to stall broadband deployment in new markets. This will have long-range implications on the competitive landscape for broadband deployment as telephone companies miss out on establishing market share that comes from selling high-speed services to early adopters.*

*From a growth perspective, whereas the cable operators are gaining subscribers in both current and new markets, the DSL carriers are limited to expanding customer penetration within existing markets. In overlapping markets where consumers have a choice between DSL and cable, faster provisioning by cable operators continues to pull a greater number of consumers toward cable modem service. Apart from these two leading access platforms, satellite, fixed wireless, and fiber-based technologies also will promote additional broadband availability in the consumer market. In the rural markets, satellite and fixed wireless will be the only connectivity platforms available to the majority of consumers. Fiber-based technologies and specifically fiber-to-the-home (FTTH), while increasing their visibility in the consumer high-speed access arena presence, will account for a very small portion of broadband subscribers over the next two years. Exhibit 1 presents the U.S. residential broadband forecast broken down by the various access platforms: cable modem, DSL, satellite, and multichannel multipoint distribution system (MMDS)-based fixed wireless.*

*Overall, the growth of broadband will increasingly cannibalize the market for dial-up Internet access. Widespread availability and tiered pricing plans offered by broadband providers will fuel this migration and push high-speed access more firmly into the mainstream consumer market. Internet service providers (ISPs) such as America Online (AOL), MSN, EarthLink, and AT&T WorldNet will become more active in the broadband space, spurring some additional competition between cable modem and DSL. **The Yankee Group believes that both cable and DSL network providers will increasingly be subject to similar regulation as the legislative bodies attempt to nurture broadband availability and adoption.** This Report examines the market forces primarily affecting the deployment of broadband access services delivered via cable modem and satellite. Other platforms for broadband access—most notably DSL—will be discussed in detail in a forthcoming Yankee Group Report.*

**Exhibit 1****Residential Broadband Subscriber Forecast**

Source: the Yankee Group, 2002



\*Note: Cable modem numbers include businesses subscribing to residential class service.

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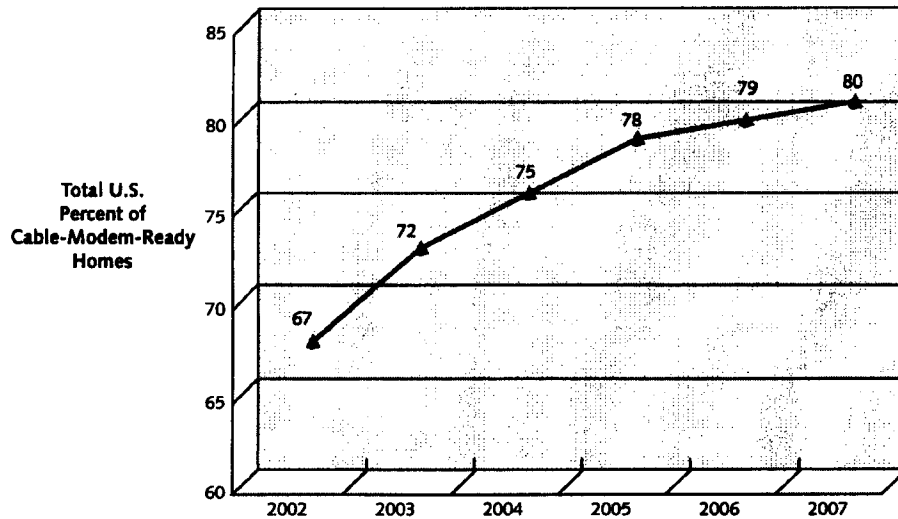
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### I. Insatiable Appetite for Broadband Access Will Continue to Drive Subscriber Growth

Despite the scaling back of broadband deployment by the service providers—specifically the RBOCs—the residential high-speed access subscriber base will continue to grow. Consumer frustration with dial-up speeds will remain the leading driver behind migration to broadband. Other growth drivers—discussed in previous Reports by the Yankee Group but still playing a significant role in shaping the market—include:

- **Expanding broadband availability continues to drive growth in subscriber base.** At the end of 2001, 60% of U.S. households had cable modem service available to them. DSL was available to approximately 45% of U.S. households over the same period. Specifically, cable MSOs are increasingly upgrading their networks to deliver advanced services including cable modem. The intensity of cable MSO initiatives in pushing broadband availability can be gauged from the fact that over 90% of Time Warner's homes passed are two-way-enabled and hence capable of delivering cable modem service. Exhibit 2 provides an overview of cable modem availability in the United States.

**Exhibit 2****Cable Modem Availability***Source: the Yankee Group, 2002*

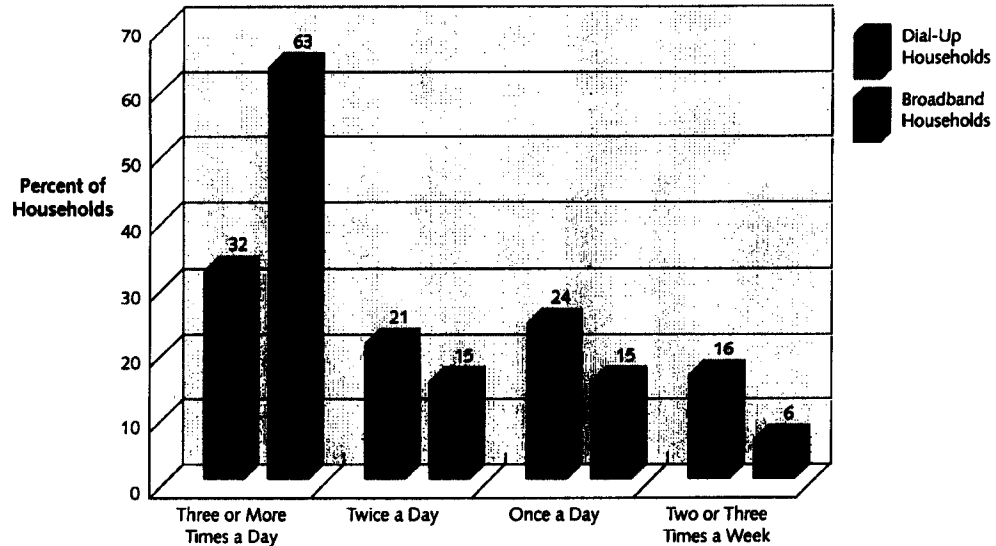
- **The need to “free up” the phone line as well as reduce the consumer’s need to subscribe to a second line specifically for Internet use.** The Yankee Group’s 2001 Technologically Advanced Family® (TAF®) Survey reveals that Internet access is the reason behind subscription to second lines among 70% of multi-line households, and that 50% of these multi-line households said that they are likely to drop their second line for high-speed access.
- **The convenience of “always-on” access.** Broadband eliminates the need for frequent log-ins by the end users, and hence facilitates usage and enhances the overall consumer online experience. Exhibit 3 compares the Internet usage behavior of broadband households with those of dial-up subscribers. Compared to dial-up subscribers, who spend an average of one hour online per session, broadband users spend three hours per session, according to the 2001 TAF® Survey.



### Exhibit 3

#### Frequency of Household Internet Access

Source: the Yankee Group 2001 TAF® Survey



- **Growth in the number of work at home individuals and small-office/home-office (SOHO) segments.** For instance, the percent of home-based businesses as a portion of total households has grown from 10% in 1997 to 15% in 2001. The complex communications needs of this segment continue to drive SOHO customers toward broadband subscription.
- **Access to broadband infrastructure by major ISPs such as AOL and MSN will help drive broadband penetration among additional dial-up households.** For instance, those households that have been online with a particular ISP for a number of years are reluctant to migrate to broadband if the change also implies switching their e-mail address or paying an extra monthly charge for keeping their legacy ISP. In addition to EarthLink, both AOL and MSN have signed agreements with the RBOCs for leasing DSL lines. A majority of EarthLink's broadband subscribers are coming from its existing base of dial-up customers. Similarly, on the cable side, Comcast and United Online (formerly NetZero) have signed an agreement whereby United Online will offer cable modem-based high-speed access to its customers.
- **The reincarnation of the former NorthPoint and Rhythms NetConnections' DSL networks by AT&T and WorldCom will further help drive broadband growth.** In addition, Sprint has also announced its plans for DSL rollout in several hundred central offices (COs).
- **Regulation will also be a key factor in driving broadband availability and adoption as well as shaping or reshaping the high-speed access competitive landscape.** The regulatory factors are discussed in greater detail in Section II. The discussion on

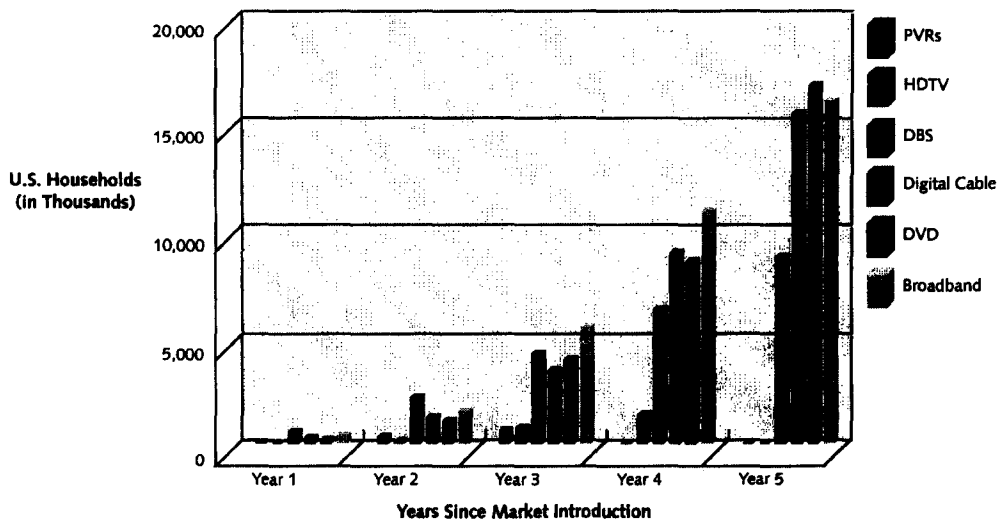
regulation in this Report is limited to open access, and ILEC-related issues are not elaborated upon in this Report.

Exhibit 4 illustrates that broadband is the fastest-growing product among consumer households in the United States, beating digital videodisc players (DVDs) and other products.

#### Exhibit 4

##### Consumer Adoption of Various Products and Services

Source: CES, Company Reports, and the Yankee Group



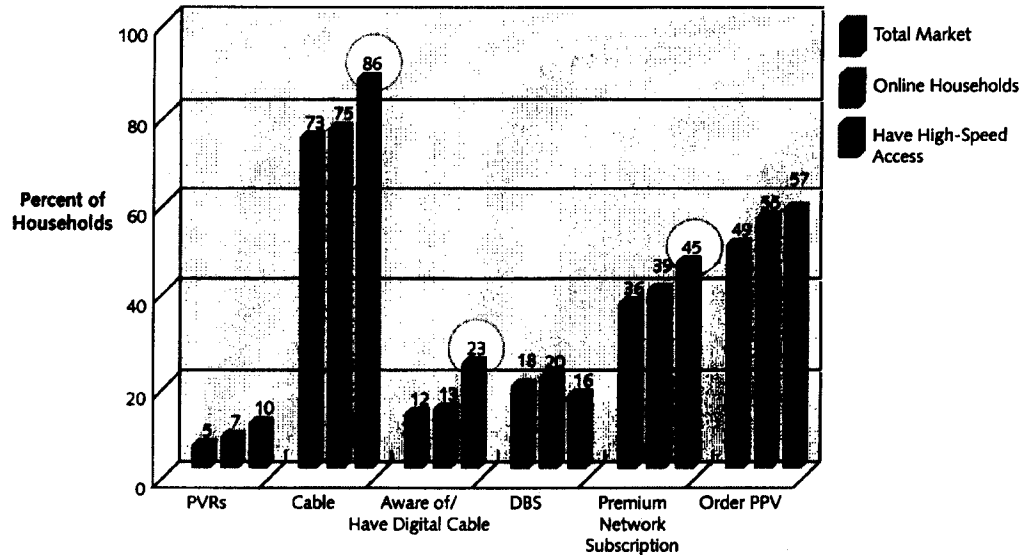
The growth of broadband, as illustrated in Exhibit 4, counteracts the rather uncertain market outlook for high-speed access portrayed in today's media and investor communities. The fact that service providers continued to experience growth in their consumer broadband subscriber base, even in the wake of rising prices and the adverse general economic environment in 2001, lends additional credence to the market potential for high-speed access.

From a broadband-service/application-provider perspective, the early-adopter characteristics of broadband households (higher income, higher education, greater propensity to consume communications and entertainment products and services, for instance) make them a viable target market for current and future on-demand content and applications. Exhibit 5 shows the adoption of certain entertainment-related products and services among the various households.

## Exhibit 5

### Adoption of Entertainment-Related Products and Services

Source: the Yankee Group 2001 TAF® Survey



Broadband households, on average, have a higher propensity for subscribing to a wider array of media options, such as digital cable and premium movie channels, as seen in Exhibit 5. This signals a potentially lucrative target market for generating incremental revenue through the delivery of on-demand media via streaming, and downloads delivered via high-speed connections. It carries special significance for cable modem providers that are best positioned to offer services such as online video-on-demand (VOD) to consumers already accustomed to buying entertainment offerings from their cable company. By delivering content and applications beyond access, service providers will be able not only to differentiate themselves but also to generate additional revenue streams.

During the coming year, the bulk of the broadband demand will continue to come from the early-adopter segment—an audience that already shows a greater penetration and usage of communications products and services. Also heavily represented in this early-adopter segment are telecommuters, home-based business workers, and individuals with above-average incomes and education. However, as cable modem availability continues to expand—and as cable operators begin offering tiered pricing options that will allow them to charge lower fees for lower-bandwidth speeds—broadband will continue on its journey to becoming a service for the mass market.

## Cable Modem Remains Invincible

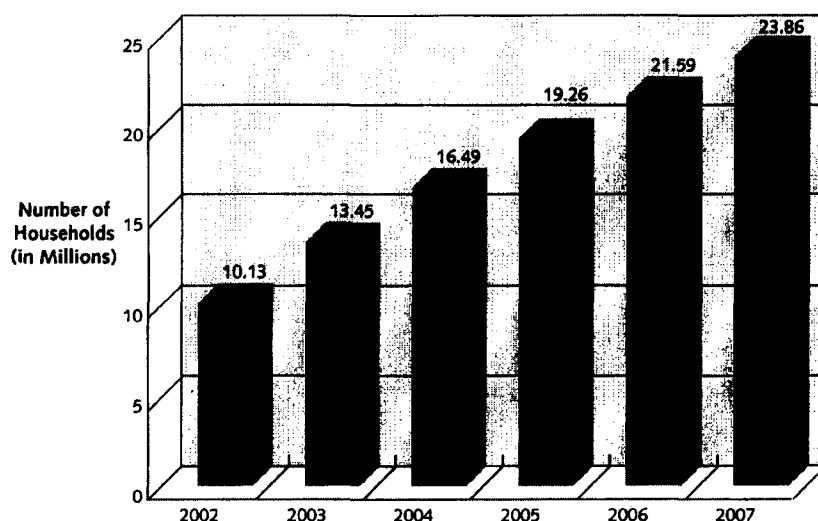
As discussed above, this Report provides an analysis of cable and satellite technologies only. Platforms such as DSL, fixed wireless, fiber, and other proprietary technologies will be discussed in a future Yankee Group Report. Both the cable and satellite industries trace their

roots to the delivery of entertainment services to consumers, making them a suitable pair in this analysis of the residential broadband market. Overall, while cable modem leads the charge in broadband availability and adoption in the metro markets, satellite services reach into rural markets largely untapped by other high-speed service providers.

Cable modem service, by virtue of its greater availability and faster provisioning, will remain the leading access platform within the consumer market. Exhibit 6 provides our residential cable modem forecast. The Yankee Group projects the residential cable modem subscriber base to reach almost 23.9 million households by 2007.

**Exhibit 6****Residential Cable Modem Forecast**

Source: the Yankee Group, 2002



From the perspective of availability, cable modem far exceeds DSL. As discussed above, nearly 60% of households had cable modem service available to them at the end of 2001. DSL availability, in comparison, lingers around 45%. This means that there are several million households where cable operators have an exclusive opportunity for selling high-speed access. This enables the MSOs to take the first-mover advantage in capturing early adopters in these markets. Widespread cable modem availability will become a more important factor during later years of the forecast as DSL expands its reach to additional markets but cannot realize strong subscriber growth due to cable's first-mover advantage in those markets. In other words, cable would have already captured a majority if not all of the early adopters in these segments, thereby putting up entry barriers for the DSL providers.

Apart from greater availability, cable modem providers will begin to roll out tiered services by the end of 2002 or early 2003. The implementation of Data Over Cable Service Interface Specification standard 1.1 (DOCSIS 1.1) will enable cable MSOs not only to deliver tiered services but also to roll out bandwidth on-demand (through dynamic bandwidth management

capability). Dynamic bandwidth management refers to a provider's ability to deliver burstable speeds when the consumers demand it. For instance, if the end user is downloading a file or streaming video, he or she would require higher bandwidth at that particular time than when simply surfing the Web. The actual implementation of dynamic bandwidth management, however, is not without challenges, including implementation of DOCSIS 1.1 by the cable MSOs as well as the layering of additional network management software. These technical challenges will lead to the rollout of tiered services on a market-by-market basis, which in turn will affect the overall implementation of tiered models.

Other concerns that cable operators must address when implementing tiered services include the level of internal revenue cannibalization and the overall business viability of such services. Exhibit 7 provides an overview of the cable modem business model, from the perspective of both network investment and monthly provisioning cost. The network and subscriber acquisition costs are a one-time expense, and the monthly charges reflect the average recurring cable modem operating costs for the MSOs. The average monthly markup of between 35% and 45% per subscriber indicates the profitability potential of cable modem service. This monthly markup, however, varies from one MSO to another based on factors such as monthly pricing and discounts on bundled services. Also, the subscriber acquisition costs can be significantly lower than those in Exhibit 7, given that the consumers purchase their own cable modems and that they utilize self-installation, thereby eliminating the truck-roll element from subscriber acquisition costs.

## Exhibit 7

### Cable Modem Deployment and Operating Costs

Source: *Company Reports and the Yankee Group*

#### Average Cable Modem Deployment Costs

Capital Expenditure	Per Home Passed
Network Equipment (CMTS and other back-office hardware and software)	\$200-\$225
HFC Two-Way Upgrading	\$125-\$200
Total	\$325-\$425

Cost per New Subscriber (One-Time Expenses)	Per New Add
Average Marketing and Customer Acquisition Costs	\$50
Installation (truck roll)	\$75-\$100
CPE (including modem, splitter, coax cable, and installation software CD)	\$150
Total	\$275-\$300

Note: The costs can be much lower with self-installations and if the end user owns the modem.

#### Average Cable Modem Monthly Operating Costs per Customer

	Per Customer/ Month
Customer Service (billing, maintenance)	\$5-\$8
Transport Fees/Network Management	\$10-\$15
Total	\$15-\$23

Average Markup per Subscriber (based on \$34.95 monthly charge and excluding modem leasing charges)

Between 35% and 45%

As it relates to self-installs, a majority of cable operators may still utilize at least a partial truck roll to either remove network filters or to wire the end-user premises, which would typically entail installing a splitter or running a coax line inside the house. The end user then activates the service utilizing self-install software or phone help desk support, if it is needed. Even if the cable operator must employ a truck roll to the subscriber's location, this is used as an opportunity to up-sell other services such as digital cable and telephony to the new cable modem subscriber. The use of in-house technicians that are trained to install all three services (phone, cable, Internet) further helps spread the costs of truck rolls over multiple services. The technician incentives for up-selling vary among products and service providers.

From a competitive standpoint, the top eight cable operators account for over 90% of all U.S. cable modem subscribers. Exhibit 8 provides the cable modem subscriber base for the various MSOs and the overbuilders.

#### Exhibit 8

#### Top Cable Modem Providers: Historic Subscriber Growth

Source: Company Reports and the Yankee Group

Company	1999	2000	2001
<b>MSOs</b>			
AT&T Broadband*	427,000	1,082,000	1,512,000
Time Warner	330,000	946,000	1,917,000
Comcast	141,900	400,000	948,100
Charter	65,600	252,400	607,700
Cox	186,918	481,947	883,562
Adelphia	37,495	148,504	377,510
Cablevision	52,100	238,511	506,675
Insight	8,300	51,800	99,500
Mediacom	500	12,000	112,300
Cable ONE	—	—	32,900
Classic Cable	—	1,581	1,200
<b>MSO Total</b>	<b>1,249,813</b>	<b>3,614,743</b>	<b>6,998,447</b>
<b>Overbuilders</b>			
RCN	21,654	66,660	119,955
Knology	4,989	14,898	32,573
<b>Overbuilder Total</b>	<b>26,643</b>	<b>81,558</b>	<b>152,528</b>
<b>Total Cable Modem Subscribers</b>	<b>1,276,456</b>	<b>3,696,301</b>	<b>7,150,975</b>

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*\* AT&T Broadband's 1999 figures include MediaOne.*

The overbuilders such as RCN and Knology—while accounting for a smaller percentage of overall subscribers—will continue to contribute positive growth to cable modem deployment. Specifically, overbuilders such as Knology that operate in second- and third-tier markets (including rural communities) will push cable modem availability into new regions beyond the major metropolitan areas.

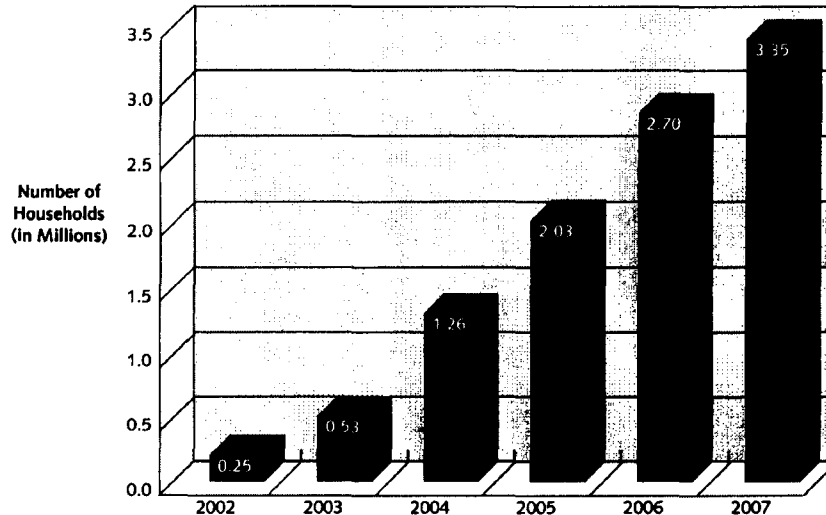
In addition, the use of retail channels by cable operators will further help them expand distribution of their service. Strong training of retail personnel in selling broadband, however, will be key in making retail an effective vehicle for attracting new subscribers. Today, most new customers for cable modem service contact cable operators directly.

Driven by its broad availability and its expanding distribution through retail, cable modem service will only widen its gap over DSL. In the absence of a compelling value proposition, consumers using cable modem service will not churn to DSL except for situations in which the consumers move geographically and have only DSL service available to them. Cable operators will also lose some subscribers in instances where consumers are dissatisfied with the cable operator and either switch to digital broadcast satellite (DBS) or simply drop cable modem service. As far as the compelling value proposition is concerned, however, the late arrival of DSL vendors to the market will ultimately drive them to play the pricing card against cable modem service providers. However, cable operators enter this competition with a pricing edge. At present, cable modem prices are already 10% or so lower than DSL (based on a comparison of \$49.95-per-month DSL and \$44.95-per-month cable modem service); and unless DSL's price drops below \$44.95 per month, cable operators will not need to change prices to stay competitive. Given these factors, the Yankee Group expects cable modem to continue as the dominant consumer broadband access platform for a number of years even beyond the forecast period.

## **Satellite-Based Access: A Technology for the Unserved/Underserved Markets**

All progress in the satellite broadband sector came to a screeching halt in 2001 due to the proposed Hughes/EchoStar merger. Hughes, through its DIRECWAY offering, is the leading player in the satellite access market. In addition to its satellite-based access, Hughes also offers DSL services to consumers. The company is estimated to have had 91,000 DSL subscribers and 101,000 DIRECWAY subscribers at the end of 2001. The other notable player is StarBand, which is partially owned by EchoStar and had 44,000 subscribers at year-end 2001.

Unless a regulatory decision on the proposed merger is made soon, it is unlikely that Hughes or EchoStar will expend large resources on promoting their satellite-based high-speed Internet services over the next 6 to 12 months. Both DIRECWAY and StarBand have signed agreements with ISPs such as AOL and EarthLink to deliver broadband access to their customers. The focus of these ISPs, however, is on using satellite as an access technology in markets where there is a lack of terrestrial broadband availability. Exhibit 9 shows our residential satellite broadband access subscriber forecast.

**Exhibit 9****Residential Satellite Broadband Forecast***Source: the Yankee Group, 2002*

Apart from Hughes and StarBand, a few other satellite-based high-speed access providers also exist. The majority of these providers, however, are facing financial difficulties and it is unlikely that they will deploy services in 2002. The potential merger between Hughes and EchoStar will further make it difficult for the other satellite providers to compete in the marketplace. Providers such as WildBlue, which had originally planned to launch its service in the 2002–2003 time period, are already experiencing difficulty in obtaining new financing. Over the next year or two, competition in the satellite-based access arena will remain limited, as the tight capital markets will make it difficult for new entrants to secure funding to deploy networks.

From a consumer perspective, the high up-front costs for satellite CPE negatively affect interest in satellite-based access. The current subsidized CPE prices are roughly \$500 for the dish and the modem. Installation costs range from \$200 to \$300, although satellite providers frequently either offer discounts on installation or eliminate the charges as part of promotional campaigns. The higher up-front costs make satellite a tough sell in markets where end users have a terrestrial alternative available to them. In addition, the monthly price of \$69.95 further hinders the consumer purchase decision for satellite-based access. This is why providers such as Hughes are expending efforts to increase their DSL subscriber count in the metro markets where they can offer DSL. Hughes's DSL services are sold via leased lines from the ILECs.

Much like cable modem, satellite access is shared; and as the number of subscribers supported by a satellite increases, bandwidth performance can be affected. Unlike cable modem providers, which can split the nodes and hence reduce bandwidth bottlenecks in service, satellite providers must invest resources in building and deploying new satellite capacity in order to alleviate network congestion—an event that can cost millions, if not billions, of dollars.



Going forward, the current Ku-band satellite systems will be complemented by the Ka-band systems. This will not only improve the overall bandwidth delivered to the subscriber, but will also reduce monthly operational costs for the satellite providers. Currently, satellite-based access can deliver a 512-Kbps downstream bandwidth. With Ka systems such as the Hughes SPACEWAY, the downstream speeds can be as high as 30 Mbps. Furthermore, the ability to use a single dish to receive both broadcast television and high-speed access will increase the attractiveness of the product. Overall, **satellite services will gain most traction in the rural markets where there is a dearth of landline alternatives.** The high CPE costs as well as the hassles involved in reinstalling the dish, in the event that an end user has moved, negatively affect the viability and attractiveness of satellite-based access in the consumer market.

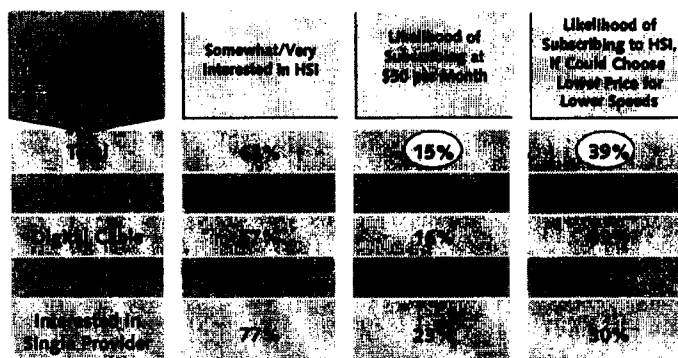
## II. Tiered Pricing Will Push Broadband Availability Beyond the Early-Adopter Segment

As the search for a broadband "killer application" continues, in the short term, pricing will be the key value proposition attracting average consumers to high-speed Internet. As demand among early adopters is saturated, cable modem providers will begin to offer tiered pricing in order to continue subscriber growth. Also, as cable operators upgrade their cable modem termination system (CMTS) from DOCSIS 1.0 to DOCSIS 1.1, they gain the ability to offer tiered service. In 2002, cable operators will focus on upgrading their CMTS to be DOCSIS 1.1-compliant and on testing tiered pricing services. In 2003, cable operators will begin offering tiered cable modem service on a wide scale. Exhibit 10 shows interest in broadband access among online households.

### Exhibit 10

#### Online Households' Interest in Broadband

Source: the Yankee Group 2001 TAF<sup>®</sup> Survey



Base: Online households without high-speed connection.

There is an inverse relationship between interest in broadband and willingness to pay \$50 per month for it. Even higher-value segments, such as telecommuters, are not immune to price sensitivity. The lack of a clear understanding of broadband's benefits by consumers as well as today's somber economic environment are key factors responsible for this price sensitivity. Service providers will have to narrow the gap between dial-up and broadband prices to generate consumer interest in high speed. By offering lower prices for lower speeds, service providers will be able to transition dial-up users over to broadband. Once these users are exposed to the benefits of broadband, they can be migrated to higher-end packages.

Apart from the technical issues involved in implementing tiered pricing, service providers also fear that low-end packages can cannibalize existing revenue streams. While it will not be possible to entirely avoid such cannibalization, a vast majority of consumers will not revert to low-end offers because these packages cannot support bandwidth-intensive applications. Also, segments such as telecommuters, home-based businesses, and those using audio and video streaming and downloading applications will not migrate to lower-speed products unless they drastically change their Internet usage habits.

As long as the average online consumer's understanding of the broadband value proposition remains fuzzy, service providers will face a challenge in pushing a \$50-per-month broadband service into the mainstream market. Tiered pricing, along with consumer education on broadband capabilities, will lead to higher adoption of the service among residential customers.

### **III. Is "Open Access" Imperative for Broadband Expansion?**

The discussion surrounding open access to cable networks by competitive ISPs is only natural as one evaluates the market for consumer broadband access. Without getting into the issue of whether open access is good or bad, from a regulatory standpoint, increased emphasis is being placed on having a uniform set of rulings applicable to both cable and telco networks.

On March 14, 2002, the Federal Communications Commission (FCC) in a Declaratory Ruling concluded that cable modem service is properly classified as an interstate "information service" and is therefore subject to the FCC's jurisdiction. The FCC determined that cable modem service is not a "cable service" as defined by the Telecommunications Act of 1996; nor is it a separate "telecommunications service" offering, so it is not subject to common carrier regulation.

At the same time, the FCC also adopted a Notice of Proposed Rulemaking to examine:

- Whether there are legal or policy reasons why it should reach different conclusions with respect to wireline broadband (DSL) and cable modem service.
- The scope of the FCC's jurisdiction to regulate cable modem service, including whether there are any constitutional limitations on the exercise of that jurisdiction.
- Whether, in light of marketplace developments, it is necessary or appropriate at this time to require multiple ISP access for cable operators.

- The role of state and local franchising authorities in regulating cable modem service.

The FCC's Declaratory Ruling and Notice of Proposed Rulemaking do not break major new ground in regard to cable operators. The result of the Declaratory Ruling is that the cable operators will not be required to open up their networks to third-party ISPs. However, the Notice of Proposed Rulemaking indicates that the FCC reserves the right to reverse this decision. In response to this ruling, a number of consumer watchdog groups as well as Verizon and EarthLink filed suit on March 25, 2002, challenging the FCC's Declaratory Ruling. Clearly, the open access debate will not disappear soon.

A key implication of the FCC's Declaratory Ruling is whether DSL services also fall under the realm of "information services." A decision classifying DSL as an "information service" would eliminate the need for the telcos to share their networks with rival service providers. The move toward a somewhat uniform regulatory environment or, rather, a lack of stringent regulatory rules for cable modem and DSL, raises concerns that government policy could foster the creation of a broadband duopoly. However, it is unlikely that such regulatory consistency will have a negative impact on overall broadband availability. At the end of 2001, nearly 60% of households had cable modem service available to them. Overall, DSL is available to approximately 45% of U.S. households. In addition, technologies such as satellite and fixed wireless will continue to bridge the gap between broadband availability in the rural markets that lack wireline high-speed access availability.

Specifically as it relates to the cable networks, open access may very well lead to the same chaos that has occurred in the DSL segment during the past year. Not only would there be an unending regulatory battle between the cable MSOs and ISPs over wholesale pricing, but such rules also would create confusion at the end-user level as consumers navigate multiple vendors to subscribe to high-speed access and tap into customer service assistance. Also, it remains unclear whether open access will be restricted to only those parts of the cable MSOs' networks that are used to deliver high-speed access, or will include other areas such as cable telephony. **The Yankee Group believes it unlikely that open access will be mandated over the next two to three years.** The cable MSOs, out of necessity, will be driven toward working with competitive ISPs rather than risk losing them to DSL. For instance, MSN, AOL, and EarthLink have reached out to the DSL providers in order to make broadband available to their customers. EarthLink, by virtue of regulation, has already gained access to the cable networks of Time Warner Cable. Similarly, MSN will eventually be able to expand its broadband offerings to include cable modem by leveraging Microsoft's existing relationship with some cable MSOs. Overall, lacking the content expertise of ISPs such as MSN, the "pipe providers" (both cable and DSL) will be compelled to work with competitive ISPs in order to expand subscriber base and wholesale revenues as well as to develop new revenue streams arising out of the provision of advanced content (such as streaming media) by these ISPs.

## IV. Conclusions

In summary, cable modem and DSL will remain the primary high-speed access technologies in the residential market. Between these two access platforms, cable modem installations will continue to outpace DSL throughout the five-year forecast period.

### Predictions

The following points highlight our outlook for the consumer broadband market:

- **Cable is king:** As discussed earlier in this Report, cable modem's tremendous lead over DSL stems from its ability to reach out to a much larger number of residential customers. DSL not only continues to face distance limitations; its overall deployment also is stymied by the RBOCs' reluctance to upgrade infrastructure in new markets. Compared to DSL, cable modem monthly rates are lower—a fact that will help cable generate greater traction in the mass consumer market.
- **Bundling presents new opportunities:** For households seeking one-stop-shop bundled solutions (voice, video, and data), the MSO becomes almost a natural choice. Over the next two years, as cable operators increasingly incorporate telephony into their product portfolio, their ability to attract customers through bundled solutions will only solidify.
- **DSL losing early-adopter race:** Focused on gaining regulatory relief from providing competitive access to their networks, and in the process stalling broadband deployment, DSL providers will continue to lose share of early adopters to cable modem. The scaling back of broadband deployment will have a stronger negative impact on DSL growth toward the second half of the forecast, as DSL is late in entering new markets where cable modem has already captured the early adopters.
- **Implementation of "voluntary open access" will help drive subscriber growth:** The implementation of "voluntary open access" by the cable operators will further help them maintain and grow their lead over DSL. Allowing ISPs such as EarthLink, MSN, and AOL onto their networks will help speed up the migration from dial-up to broadband.
- **Price remains the key value proposition:** Though price has not been a barrier to early adopters, it will increasingly become one as broadband providers attempt to reach into the mass market. Implementation of tiered pricing will not only help service providers gain new subscribers, but will also assist in reducing churn among those that want high-speed access and are likely to switch providers based on pricing. The narrower the gap between low-end broadband and dial-up prices, the greater the success service providers will have in migrating customers to broadband. Service providers, however, will only implement tiered pricing based on the financial viability of such schemes.
- **Deployment of applications will increase "stickiness" of broadband:** While broadband in and of itself is "addicting" (meaning those that have subscribed to the service will not revert to dial-up), the deployment of advanced applications such as streaming or downloading media content will further increase the stickiness of the product. Development of applications such as streaming video will help access

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providers differentiate themselves from competitors and—at the same time—generate additional revenues. Yet the adoption and usage of entertainment-related applications via the PC will remain limited among certain niche segments as consumers continue to view their TV as the hub of entertainment.

## V. Further Reading

“Internet VOD: Bringing the Box Office to the PC and Beyond,” *Yankee Group Report, Media & Entertainment Strategies*, Vol. 6, No. 3, March 2002.

“Unlicensed Fixed Wireless: Setting the Stage for Greater Broadband Availability?,” *Yankee Group Report, Consumer Market Convergence*, Vol. 19, No. 1, January 2002.

“Fiber-to-the-Curb, Fiber-to-the-Home, Fixed Wireless, and Powerline Communications: Threatening Cable Modem’s and DSL’s Hegemony?,” *Yankee Group Report, Consumer Market Convergence*, Vol. 18, No. 13, November 2001.

“Residential Broadband: Provisioning Cable Modem Service,” *Yankee Group Report, Media & Entertainment Strategies*, Vol. 5, No. 14, October 2001.

“Streaming Software: Broadband’s Quiet Killer App,” *Yankee Group Report, Media & Entertainment Strategies*, Vol. 5, No. 10, July 2001.